

# MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 11

March, 1939

Number 10

## CONTENTS

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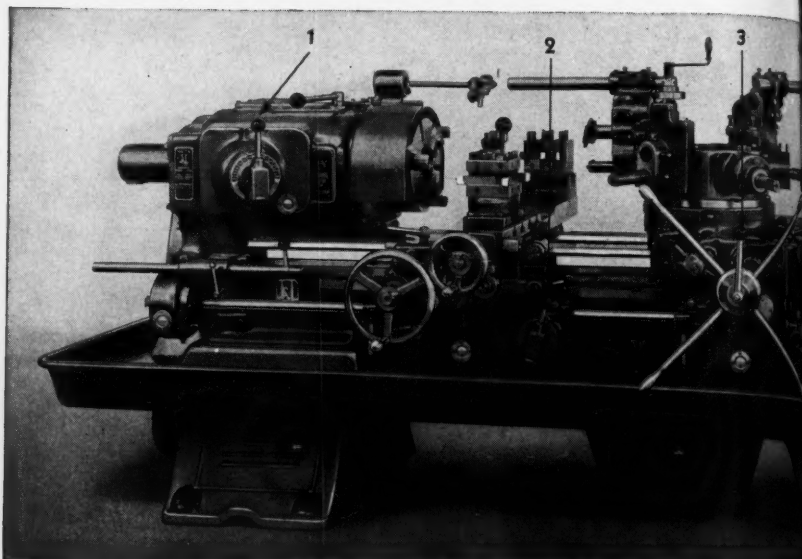
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Employee Education Methods at Farrel-Birmingham.....	59
By WALTER L. TANN	
An Analysis of Gear Inspection Methods.....	76
By DOUGLAS T. HAMILTON	
Baldwin-Southwark Plant Designed for Massive Work.....	98
By HOWARD CAMPBELL	
What Is a Tool Engineer?.....	108
By WALTER F. WAGNER	
A. S. T. E. Convention and Machine and Tool Progress Exhibition .....	114
List of Tool Show Exhibitors.....	122
Over the Editor's Desk.....	138
New Equipment at the Show.....	140
New Shop Equipment.....	162
Catalog Library .....	234
Services Directory .....	236
Index to Advertisements.....	238

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**JONES & LAMSON  
MACHINE COMPANY  
SPRINGFIELD • VERMONT**



# MODERN Machine Shop

CINCINNATI, OHIO

MARCH, 1939

VOL. 11, No. 10

## Employee Education Methods at Farrel-Birmingham

*In this article the author presents an outline of the instruction course developed by the Farrel-Birmingham Company for training apprentices.*

By WALTER L. TANN

Planning and Control Engineer, Farrel-Birmingham Company, Inc.

BECAUSE of the diversity of products made by our firm, with a size range from a single casting weighing 70 tons down to one weighing a fraction of a pound, and the consideration that processing and finishing requirements vary from a rough casting requiring no finish up to ground rolls that are accurate to within five hundred thousandths of an inch (0.00005 in.), any industrial plant executive will at once spot a difficult problem of manpower and employee training.

Our company is over one hundred years old. In its earlier history new employees received their training from the journeymen in the shops, in addition to direct instruction given

by foremen. It is almost needless to repeat here that in normal times there is a serious shortage of skilled pattern makers, molders, machinists and welders. At every gathering of industrial executives, engineering societies and similar groups within the last five years, one could hear many speakers on the general subject of Employee Training and Apprenticeship Courses, some discussing the training of specialists for their particular fields, and others discussing the broad feature of a program for turning out all-around trained mechanics who would be experts in every phase of their trades.

The reason for this shortage of all-



Group of Farrel-Birmingham Apprentices with Plant Executives and Apprentice Supervisors

around skilled men is not difficult to understand, as it arises from the fact that many plants have been training men to specialize on one machine or one operation. This specialization, which we ourselves use because it has its place in the industrial training plan, does not, however, solve the larger question of training the real mechanic—the man who not only knows and practices the technic of his trade but in addition knows the product and its uses in the customer's plant. In our business, this point is of the utmost importance, as our best mechanics not only work on the various orders for equipment while in process of manufacture, but later may be sent out to the customer's plant to erect and install this same equipment, often staying on until the machinery has been put into actual production. Or he may travel hundreds of miles on a service or repair call and find himself to be the only man in the customer's plant who knows what should be done.

It is apparent that the lathe specialist—or the erecting specialist—would be of doubtful value in an organization operating under such day-by-day requirements. We have a problem that calls for versatile mechanics; men who are masters of

their trades and educated to our particular requirements. All of our products are highly technical and come under the general industrial classification of heavy machinery. In addition, our products are highly specialized, and as the demand for them does not lend itself to making up stock-orders on a production basis, each order must be handled on a job order basis.

Let us make a case study of our machine shop. The life of heavy machinery, with good maintenance and proper operating care, is usually long, but the inevitable wear and occasional accidents are the cause of our receiving, frequently, a telephoned or wired order for a part that, by lack, may be holding up all production in a continuous-process plant. Our Planning and Control Department is set up to take care of just such emergencies as this and orders are started through for this repair part on what we classify as "break-down" priority basis.

From our methods and operational analysis records we can foresee that certain mechanics must double-up on certain machines, and additional shifts must be put on, using men who can be spared from production that is not so urgent. If the mechanic

chosen were specialists in the operation of one type or class of machine, such shifting of personnel would be impossible. Also, due to the large size of much of our work, our machine tools are very expensive and we must keep them working on production as continuously as possible in order to absorb their burden. Thus it can be seen that unless our machinists are all-around men, we could not shift them for an emergency job like the one in question and we would be badly handicapped.

It is also apparent that our machinists must know how to operate a variety of machine tools and operate them efficiently, but in addition they must know what our products are used for, how they are used, and what extreme service conditions may be encountered in the customer's plant. And further, they must know how the various departments of our plant function with respect to each other, so that they may co-operate in the greatest measure, shortening the delivery on this emergency job, getting it shipped to the customer's plant, getting it installed in the idle machine, and thus putting the customer's plant back into production in the shortest possible time.

We find that the only way to obtain men with the training, skill, and experience that we require is to train them ourselves. Nothing, of course,

can take the place of actual experience on a particular operation or class of product, but our aim—and it has been proved to be successful—is to provide a broad, basic training in a trade and then let the natural inclinations and gifts of a man guide him into the particular niche in the plant where he will be the most efficient and happiest at his work. Such accomplishments have values in this changing world that may far transcend the value of the training from a strictly commercial standpoint, as they tend toward good citizenship, a good community spirit, and good industrial relations in general.

Various training plans are maintained by the company and include the regular Apprentice Training Courses, the Student Engineering Courses, Learners' Training Courses, and an Evening Study Group. As the apprentice courses cover the largest group of employees taking supervised training, it will be well first to describe this program.

#### The Apprentice Training Program

The boys selected must be high school graduates, and are usually local boys, with friends or relatives who are known to be skilled workmen, loyal to the company and its aims, already in the employ of the company. Fathers and sons are thus often seen working together, which



Apprentice Assembly Being Addressed by Vice President A. S. Redway

is a great bulder of shop morale and adds strength and interest to our training program.

The preliminary selection of the apprentice is made by the employment manager, who turns the boy over to the apprentice supervisor for a long, personal interview and discussion of the boy's desires, aims, and aptitudes. A genuine effort is made by the apprentice supervisor to learn all that he can about the applicant and, at the same time, to tell him all about the apprentice training course, the company and its policies, and something of the products of the company.

As an alternate to the selection procedure described in the preceding paragraph, we sometimes hire two or three boys who have signified their desire to become apprentices and put them at work as helpers or learners. Their aptitudes, personalities, ability to get along with fellow-workers, and their general characteristics are carefully observed, and finally one is selected as a probationary apprentice candidate. This one passes through the procedures described in the following paragraphs. This might be termed "pre-apprenticeship selection" and is a dependable method of selecting a boy who will be fitted to the trade and to the shop surroundings. Those not selected as probationary apprentices are either retained in their helper or learner status or are advised to find some other vocation for which they are better suited.

If the apprentice applicant is recommended as a result of this interview, he is passed on to the superintendent of the foundry if he wishes to become a molding apprentice, or to the superintendent of the machine shop if he wishes to become a machinist apprentice. If he satisfies these executives, he is interviewed by the vice president, and if he meets with this further approval, he is

placed on the rolls as a probationary apprentice.

Each boy selected must serve probationary period of approximately one thousand hours before becoming a regular indentured apprentice. During this period the plant executives have an opportunity to study his personality and habits, as well as his aptitudes and general fitness for the trade he has selected as the basis for his life work. The boy, during this period, is also able to observe conditions in the plant and those surrounding his trade, and to satisfy himself that he will be happy and successful in the work.

If, after this probationary period, both the company and the boy are satisfied with the arrangement, the boy enters into a contract with the company for a period of eight thousand hours of training and employment, agreeing to follow a well laid out course of training in both classroom and shops. The thousand hours of the probationary period are included in the eight thousand hour period of his apprenticeship contract.

The apprenticeship contract is signed by the apprentice, the parents of the boy, and the vice president, which conveys to the apprentice and to his parents a feeling of dignity and sincerity, makes the apprentice an integral part of the company, and assures him of the permanency of the training program. To the company, the signing of the contract secures the interest and confidence of the executives and foremen in the apprentice, and makes them responsible for his training.

At the present time the apprentice training includes machinist, molding and core maker apprentice training courses, each with a carefully planned program of practical and theoretical training in the shops and classroom. These programs provide

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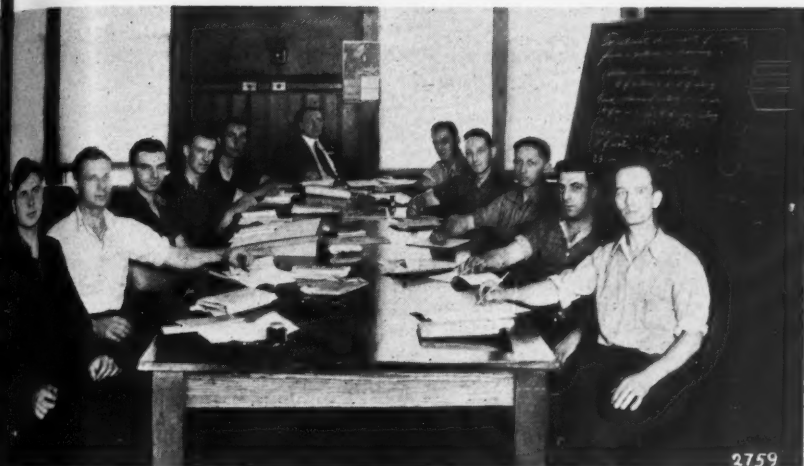
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March, 1939



Foundry Apprentices with Mr. R. G. Hartwell, Apprentice Supervisor

for the transfer of the apprentice  
from department to department and  
well from machine to machine as he pro-  
ceeds with his training. The mini-  
mum time spent in any one depart-  
ment, on any of the industrial pro-  
cesses and under foreman instruction,  
is 250 hours, and ranges up to a max-  
imum of 1,000 hours.

The company apprentice supervisor  
has full supervision over the appren-  
tice training program. He is trained  
specially for this work, with many  
years of practical experience and with  
a genuine interest in young men and  
their vocational problems. His duties  
are to contact the plant executives,  
keep all records pertaining to the to-  
tal and departmental time of the ap-  
prentices, recommend wage increases,  
submit all reports, and arrange for  
the transfer of apprentices through  
the various departments in the shops.

The apprentice supervisor is also  
personally responsible for all class-  
room activities. The class room is  
spacious and well lighted, and is  
equipped with 24 office desks and all  
other necessary facilities, including

equipment for mechanical drawing  
and the necessary school supplies.

In co-operation with the appren-  
tice, arrangements are made for the  
use of the best instruction books it  
is possible to obtain. The books are  
fully illustrated and are the product  
of the best engineering minds in the  
universities and in industry. These  
texts are studied in the classroom or  
at home. To guard against favoritism  
and to ensure efficiency, provision has  
been made to have all examination  
papers corrected by capable persons  
not connected with the company.

The classroom procedure provides  
for individual instruction and for the  
recognition of individual differences  
in the mental alertness and aptitudes  
of the apprentices. Two and one-half  
hours per week are spent in the class-  
room by each apprentice.

By carefully planning the lesson as-  
signments, classroom instruction is  
closely correlated with actual shop  
experience. For example, when a  
machinist apprentice starts working  
on gear cutters, he is assigned les-  
sons on gear cutting and gear cal-



culations. In the same manner, an apprentice molder in the foundry is given instruction on molding, core making, or pattern making during the periods when he is working on the molding floor, in the corerom, or in the pattern shop.

To maintain a well rounded course, keeping in mind the general education of the boy, the related and technical lessons are supplemented by a review of mathematics, mechanical drawing and blueprint reading, and a course in English. Industrial economics is also included because we believe that labor cannot be expected to take an intelligent interest in industry unless it is taught to understand better the economic forces with which industry is confronted.

The classroom instruction is supplemented by shop talks by the executives on subjects pertaining to the product, to the operation and management of a modern industrial plant and other subjects in which the apprentices are interested. This feature is explained in detail further on in this article. Apprentices earn a good living wage while they learn and wage increases are given by approximately one thousand hour periods. It is believed that, as a group, there are no higher paid apprentices in the country.

#### **Machinist Apprentice Training Course**

As the machinist apprentice training course is typical in its general arrangement of all of our courses, and as most MODERN MACHINE SHOP readers will be more directly inter-

ested in this phase of our apprentice training program, the detailed Schedule of Progression for this course is given below.

	Hrs. (Approx.)
Tool Crib .....	500
Layout Tables .....	500
Blacksmith Shop .....	500
Foundry and Pattern Shop— Planning and Control and Engineering .....	500
Gear Cutters .....	500
Drills .....	500
Lathes and Milling Machines .....	1,000
Erecting No. 1 and Small Parts .....	1,000
Boring Mills .....	1,000
Planers and Shapers .....	1,000
Erecting No. 2 and Toolroom .....	1,000
<b>TOTAL</b> .....	<b>8,000</b>

Transfers from department to department are made in January, April, July, and October.

#### **Classroom Instruction Parallel Shop Assignments**

As the apprentice begins work on his first assignment in the tool crib he is given classroom instruction in shop mathematics, tool grinding, shop economics, together with special instruction — on and study of various manufacturers' catalogs and small tools. When serving his assignment on the layout tables, he studies measuring instruments and their use, shop trigonometry, bench work, elements of theoretical mechanics, and shop report writing.

*You are invited to make your headquarters at  
**MODERN MACHINE SHOP Booth No. B-4**  
while visiting the Tool Show*

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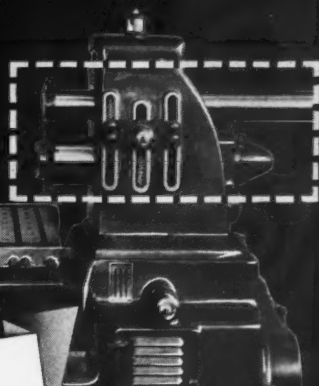
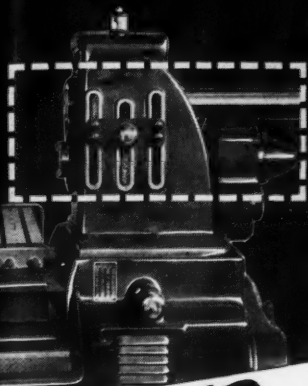
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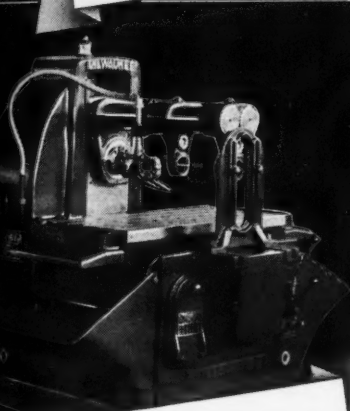
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**GREATER *Range* 7 INCHES**  
**CROSS ADJUSTMENT, SUPPORTED**  
**OVER ENTIRE RANGE**



***Rigidity* ASSURES**  
**SUSTAINED ACCURACY**

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Anchored quill construction is one of the outstanding advantages of Milwaukee Simplex and Duplex, Bed Type, Milling Machines—provides 7 inches cross adjustment, resulting in greater range without sacrifice of rigidity. Every unit designed for strength, compactness and sustained accuracy under heavy continuous service. » » »

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WEST ALLIS STATION MILWAUKEE, WIS.

MORE THAN  
***40 years***  
OF DOING  
ONE THING WELL



# ***Milwaukee* MILLING MACHINES**



He next progresses to the blacksmith shop, where his texts cover the elements of metallurgy of iron and steel, hardening and tempering, and the heat treatment of low carbon steels.

That the apprentice may know something of foundry practice and the processes involved in the molding and casting of the steel and iron castings to which he has now become accustomed, he is next transferred to the pattern shop and later to the foundries. While on that assignment, his text books and classroom instruction cover molding, core making, pattern making, ferrous metallurgy and pattern shop and foundry equipment. Here he also begins his study of mechanical drawing, because we believe that the quickest way to become proficient in the art of rapidly and accurately reading shop blueprints, is by learning how to make a good mechanical drawing, with geometrically correct views and sections, together with proper dimensioning and explanatory notes.

As an aid to the broadening of the apprentice's viewpoint, which is now rapidly forming, he is next given a short tour of duty in the engineering department, followed by an assignment in the planning and control department, and later in the cost department. In these office assignments, no attempt is made to engage the apprentice in the routine of the work; rather, it is intended that he shall see how these departments operate and why they are such important parts of the industrial picture that is beginning to develop before him. The operation of these departments is carefully explained by department heads, and, by observation and simple assignments of work, the apprentice gathers a good, practical idea of the functions of these departments with relation to actual

work processing in the shops.

Going back to the shops, the apprentice is assigned to the gear cutting machines and, in conjunction with his practical work, studies gear design and calculations, gear cutting machines of all types, and precision measuring instruments and their use. He also studies the special materials used in the gears we manufacture.

The operation of drills, to which the apprentice is next transferred, is linked with instruction in the design and operation of drilling machines of all types, advanced tool grinding, with special texts and instructions furnished by one of the large manufacturers of twist drills and other small tools. From the drills he progresses to the lathe department, and from there to the milling machine. His classroom and home-study work here is devoted to a thorough and complete study of lathes and lathe work of all types, milling machines and milling cutters, and the use of milling machines on indexed and spiral work.

To provide a break in machine tool operation, the apprentice now goes to the small parts department where he is initiated into fitting bench work, and the erection of small machines. Here his theoretical studies cover grinding, chipping, filing and scraping. Through special instruction, he becomes familiar with both the theory and practice of oxyacetylene, electric and thermit welding.

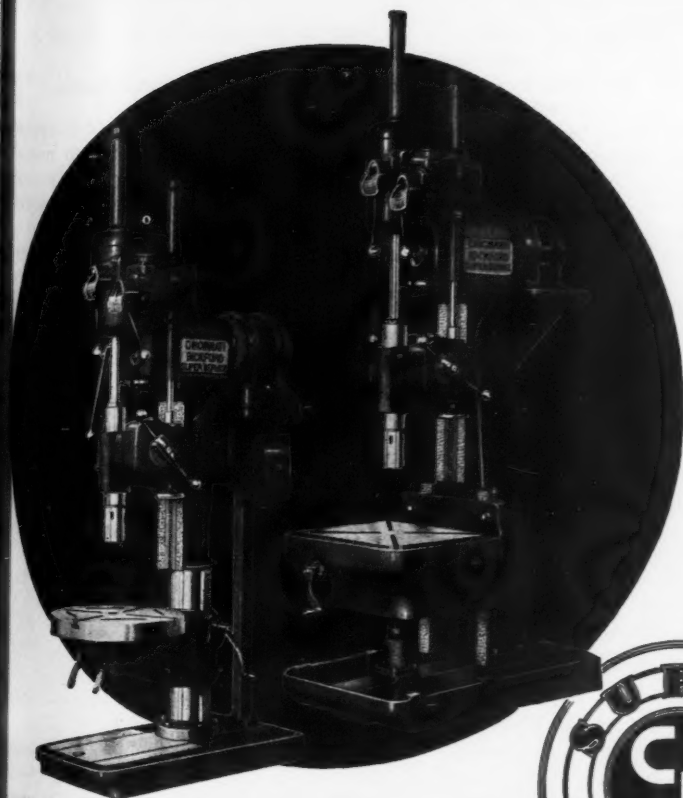
Boring mills, both vertical and horizontal, next receive his attention and his classroom work covers the theory of their design and operation. In our boring mill equipment range from the ordinary mill found in machine shops up to some of the largest horizontal mills ever built, the apprentice receives special instruction in the particular requirements of finish

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## DRILL IT FASTER With Super-Service Uprights

Faster operation from—table arm controls at front of machine... automatic depth gauge... radial drill type of spindle control and feed engagement... direct reading speed and feed plates and... convenient levers for instant engagement of feed and speed.

Longer life from—direct connected driving motor... positive type feed clutch... automatic oiling... ball and roller bearing construction... use of heat treated alloy steel gearing... multiple splined shafts with integral keys and... complete enclosure of all mechanism. Write for Bulletin U-22.

# THE CINCINNATI BICKFORD TOOL CO.

OAKLEY CINCINNATI OHIO U.S.A.

MODERN MACHINE SHOP 67

accuracy on our class of work.

His next assignment is the operation of planers and shapers, supplemented by class instruction in the design and methods of efficient operation of these machine tools. At this stage of his apprenticeship, the boy is given his first problems in the analysis of current shop jobs, giving special attention to the economical sequence of machining operations, combining operations in one set-up, and so on. In other words, he is trained to look at a machining problem as he would if he were an engineer from the methods division.

At the time of his next transfer, the apprentice goes to the erecting shop, and finally to the toolroom. In these last months of his training he completes the mechanical drawing assignments on which he has been working continuously since he was on the pattern shop and foundries tour of duty, carrying this important subject along in addition to his other studies.

Aside from the text book and classroom instruction, we find that one of the most prolific and best sources of information on machine tool operation is found in the very excellent catalogs and instruction books issued by the various machine tool builders. The apprentice supervisor maintains a complete file of these, always at the disposal of the apprentice and charged out systematically.

With the help of the apprentice supervisor, our apprentices gradually acquire a tremendous amount of information concerning the design, operation, capacity and maintenance of our machine tools. In addition to the catalogs and instruction books mentioned, this file also contains manufacturers' latest catalogs and booklets on welding and foundry equipment—in fact, on any subject pertaining to the equipment or processes

used in the manufacture of our product.

### Apprentice Assemblies

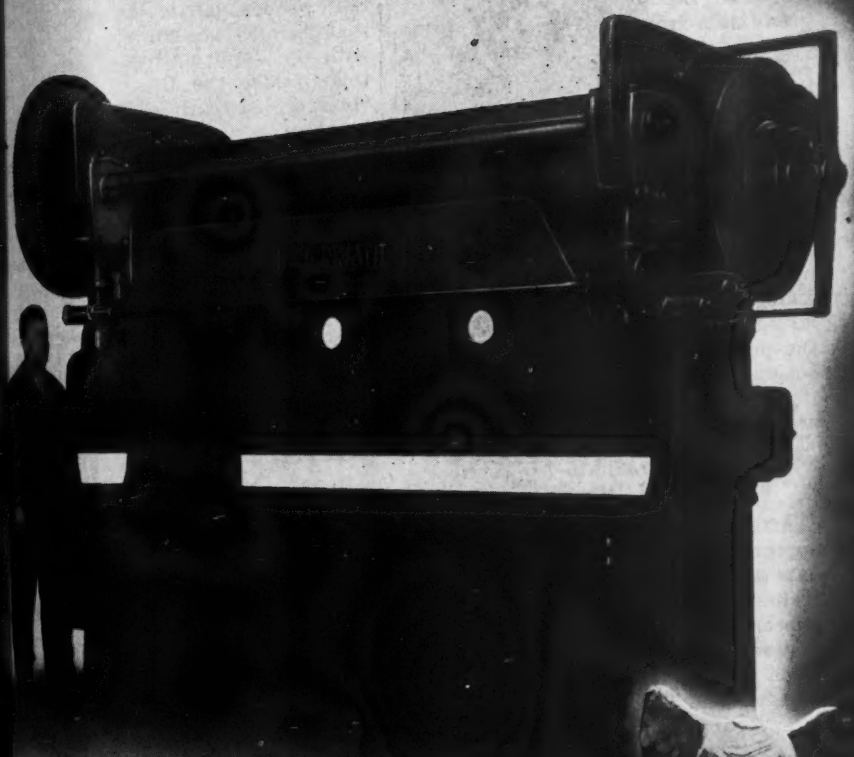
One valuable phase of our apprentice training program is the number of contacts that are made possible between apprentices and company executives. These are arranged in special gatherings in the apprentice school and usually are attended by all apprentices. A general or executive or design engineer talks to the apprentices on a subject of interest. The topic may be a detailed description of the design problems encountered by the engineering department on a particularly large or intricate job, or perhaps the speaker will deliver a special lecture on the metallurgy of some of our special analysis metals.

At a meeting held during the past year, full and complete answers were given by the vice president to questions which the apprentices had been encouraged to ask concerning topics as "Company Employment Policy," "Opportunity for Promotion," "Company Policy on Product Development," and so on. The amount of interest shown at these contact meetings is truly amazing and is definite proof that our apprentice training program is measuring up to its job.

Another interesting and valuable feature of our program consists of inspection trips, taken at intervals to nearby plants where other comparable high-grade machinery is built. These trips are made under reciprocal agreements and act as great interest stimulators.

Upon completion of the present training period, the apprentice is awarded a bonus of \$100 in cash, Certificate of Apprenticeship and Scholarship Diploma. Graduation exercises are usually timed to coincide with the customary June commemo-

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The small general utility Cincinnati Press  
Brakes, like their Big Brothers, are sturdy  
and perform with the same machine  
tool accuracy . . . . .



THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

S H A P E R S      -      S H E A R S      -      B R A K E S

ment exercises of local schools and colleges, and are attended by all apprentices and their families, the President and Vice President of the company, and other company executives, and the event reflects the dignity and sincerity that it deserves. We feel, and we know that the apprentices and their families feel likewise, that graduation from our apprentice training course marks a milestone in the career of the young man.

By his graduation, the student has proved to the world that he can follow and successfully complete a rigorous course of trade training, both in practice and in theory, and he has proved to himself the dignity of labor. The education that he has received, both in technical and cultural subjects, has equipped him to think straight on life's problems, whether the problem be one of a complicated set-up on a gear machine, or unmasking the half-truths of pseudo-political and social economists.

#### **Training of Graduate Apprentices and Others**

After completion of the regular apprentice training course, the graduate apprentice may join an advanced training group that meets with the apprentice supervisor once a week. Courses of study for this group include "Industrial Organization and Management," "Advanced Metallurgy," and optional subjects which the graduate feels are interesting and of future value to him. A great majority of our graduates are members of this group, because having formed the study habit during their apprenticeship they find it easy to keep it up, and as all are firm believers that "knowledge is power," they continue their efforts to make the most of their opportunities.

In addition to the apprentice training program outlined above, the com-

pany also conducts training program for "learners." We classify as learner a man, usually young, who taken on by the company and taught to operate one class or type of machine tool. He is the "specialist" and the apprentice supervisor provides him with texts and individual instruction on his particular specialty, so that he may become rapidly familiar with the requirements of his job and thus reduce the time when he is "learner" in truth as well as by designation.

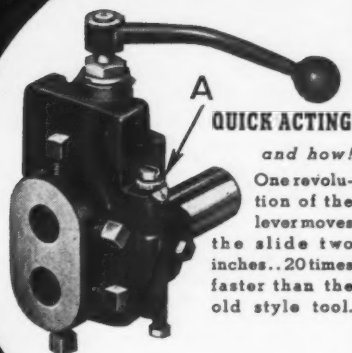
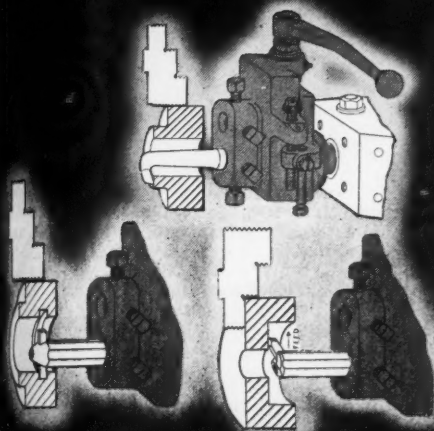
Many of our older mechanics who never before had the opportunity to enjoy supervised training in the technical theory of their trades are pursuing special training courses and are discovering new fields for thought as they study Metallurgy, Chemistry of Iron and Steel, Metallography, Welding, Theory of Abrasives, and countless other subjects with which they have dealt for years without understanding any of the underlying principles and theories.

In fact, at the time this is written we have 50 apprentices enrolled in our regular apprentice training program, but we also have 40 men, many of them with years of service with the company, taking special courses on subjects pertaining to their daily work. This, we believe, is a more creditable showing and proof of the worker, if properly encouraged and provided with facilities, supervision and avenues of information, is more than willing to do his part in increasing his efficiency at his daily task.

In the second part of this article which will be continued, the writer will discuss the Student Engineering Training Program and also the Evening Study Group. This latter group was started by the writer a little more than a year ago to fill a need that he felt to be evident. The devel-



# If you do Recessing, Back Facing or Inside Facing on Hard or Soft Metals



Shank Sizes—1", 1 1/4", 1 1/2", 1 3/4"

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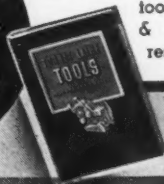
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opment of this group from a nucleus of 3 to the present attendance of 20 makes an interesting story, and one that the writer believes will be helpful to all industrial executives who realize that employee training should not stop at the shop door but must be carried into the engineering and production offices if they are to have a co-ordinated organization, high company morale, and employees who know not only the "how" but also the "why" of every task allotted to them.

**CP Airplane Tools.** In this 20-page bulletin Chicago Pneumatic Tool Company, 6 East 44th St., New York, N. Y., presents a line of pneumatic tools especially designed for airplane manufacture. Beginning with the different types of riveting hammers designed for this work, the compression riveters, both portable and stationary, yoke riveters, planishing irons, balancers, rotary drills, screw drivers, nut runners, grinders, electric tools, and other tools are presented in sequence, concluding with several types of CP air compressors.

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This 16-page booklet, now being distributed by Tide Water Associated Oil Company, 17 Battery Place, New York, N. Y., discusses in turn the different types of problems presented in the machining of metal on the various types of machines, the paragraphs being headed "Turning and Boring," "Shap-

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# SOCKET SCREWS

# An Analysis of Gears

By DOUGLAS T. H.

**T**HE first question that presents itself when gear inspection is discussed is: What is an accurate gear? Many gear men would answer this question by stating that an accurate gear is one which is made to comply with specifications, with particular reference to tooth shape and dimensions. The second question naturally follows: What specifications or requirements are necessary to assure

gear accuracy in production?

Since the principal use of gears is to transmit motion from one shaft to another, they must transmit this motion smoothly and uniformly in order to successfully fulfill their function. This requires that the length of the line of action must be longer than the base pitch, that there is no interference, that the mating tooth shapes provide conjugate action, that the teeth are evenly spaced, that the contacting tooth surfaces have a smooth finish, and that the gear be reasonably concentric.

Elaborating on these requirements, the teeth should be of sufficient length to assure a line of action which is equal to or greater in length than 1.15 times the base pitch. (The base pitch is the distance along the line of action between two successive teeth.) The proportions of this tooth element are a matter of design, although certain manufacturing errors can defeat its successful obtainment, as, for example, too much tip relief, irregular tooth spacing, errors in gear mounting, and so on.

Uneven tooth spacing causes the driven gear to alternately accelerate and decelerate as the mating teeth come into and go out of mesh. In other words, the motion is not smooth and continuous.

Tooth shapes which do not provide

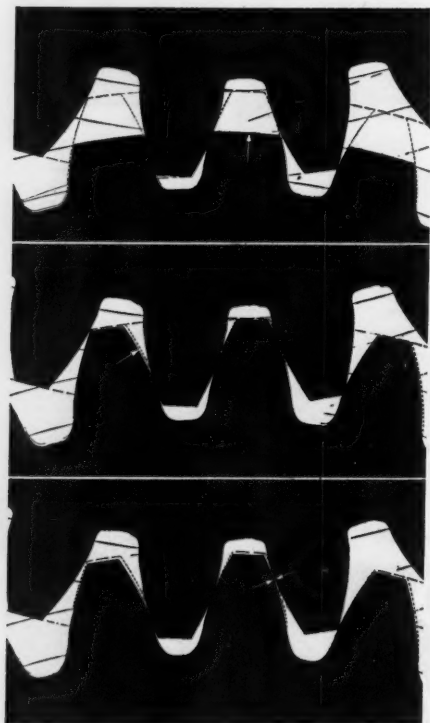


Fig. 1 (Top)—Profile of gear with standard teeth. Fig. 2 (Center)—Teeth unevenly spaced on one of these gears. Fig. 3 (Bottom)—Pressure angles on these gears are not identical.

# Inspection Methods

GLAS T. H. Gear Shaper Company, Springfield, Vt.

conjugate action have a similar effect, and this is especially so if the active profile is not of sufficient length to obtain a line of action that is greater than the base pitch.

Interference is contact of the teeth at some other point than along the line of action and can result from improper tooth design, inaccurate cutting, and mounting gears at a shorter center distance than that intended. Interference is a serious source of vibration and hence contributes to noisy operation. A smooth finish on the working surfaces of the teeth is highly desirable, if quiet operation is demanded. This subject will be more fully discussed later.

## Errors in Gears

The illustrations present several gears having definite known inaccuracies. The gears are all of the same pitch, pressure angle, pitch diameter, and number of teeth. They have 32 teeth, 20-deg. pressure angle, and full length teeth. By projecting the teeth of these gears to an enlarged scale, it is possible to clearly visualize the inaccuracies. In all cases a defective gear is shown in mesh with a master gear of known accuracy, so that the error can be more clearly indicated.

Fig. 1. The teeth of one of these gears have been shortened so that the

length of the line of action is less than the base pitch. When the gears are rotated in mesh, the action will be intermittent instead of continuous, resulting in an accelerating and decelerating motion.

Fig. 2. One of these gears was purposely made with teeth unevenly spaced. This defect causes the driven gear to accelerate and decelerate as the teeth pass into and out of mesh;

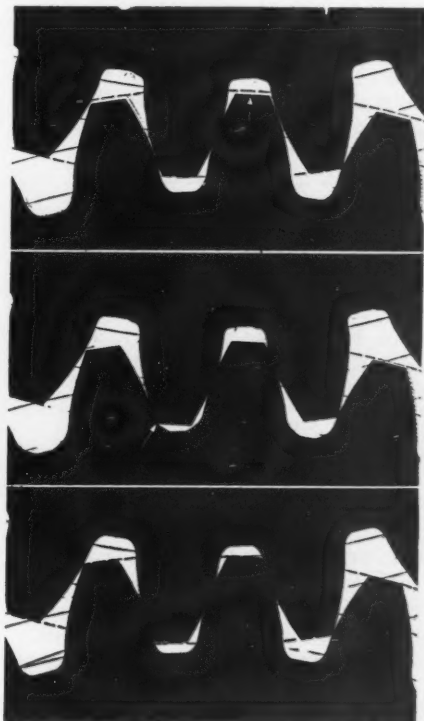


Fig. 4 (Top)—Lower gear has eccentric pitch  
Fig. 5 (Center)—Lower gear has high  
tooth spacing  
Fig. 6 (Bottom)—Profile of perfectly cut gear.

also, if we reduce the center distance, the gears become inoperative due to the lack of backlash at those points

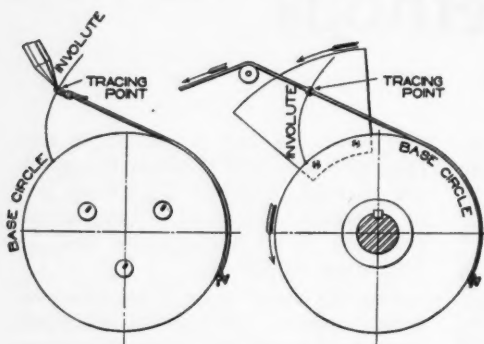


Fig. 7—Diagram illustrating theory of involute curve.

where the teeth are unevenly spaced.

Fig. 3. One of these gears is made with a different pressure angle than its mate. If the gears are operated together without load, so that no tooth deflection takes place, this difference in pressure angle causes an interrupted motion somewhat similar to that resulting where the teeth are not of sufficient length to provide continuous action. However, if sufficient load is applied to deflect the teeth, then the arc of action is longer than is possible without load, and this defect is somewhat mitigated.

Fig. 4. One of these gears is purposely cut eccentric, producing a defect known as eccentricity of the pitch circle. In one position there is sufficient backlash between the teeth that they can operate freely. In a position diametrically opposite, the teeth lock because of lack of backlash.

Fig. 5. One of these gears was purposely made with a high fillet, and the result is clearly shown. As the

gears are rotated, the teeth have peculiar jerky action as they pass through mesh. When operated at high speeds, this defect would cause the gears to vibrate and contribute toward noisy operation.

### Gears Require a Smooth Working Surface

In recent years, considerable effort has been made to produce gears having smooth contacting tooth-surfaces. It is generally appreciated that in perspective of the accuracy of the tooth elements, the condition of the tooth surface has a direct bearing on the smooth operation and life of the gears.

If two gears are operated together it will be noticed that there is very little rolling action between the teeth. In fact, theoretically speaking there is only one point where the rolling is present and that is directly on the pitch line. At all other points

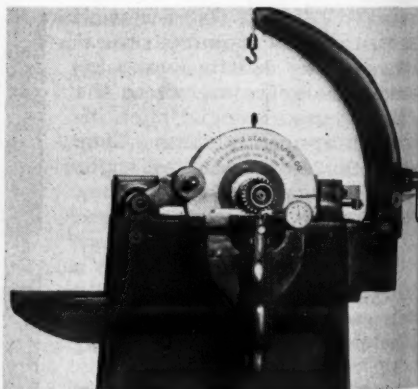


Fig. 8—Involute testing machine.

the teeth slip upon each other. Therefore, if the tooth surfaces are not smooth, the action of the gears is such that considerable vibration

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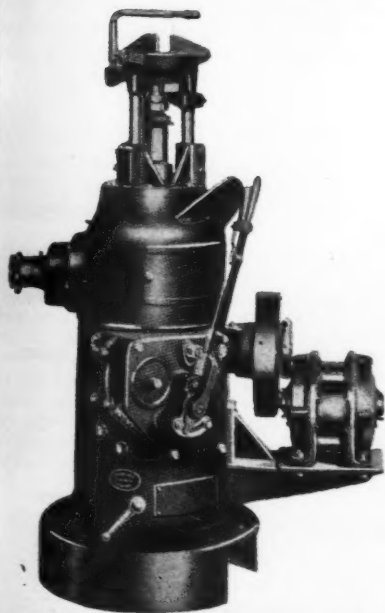
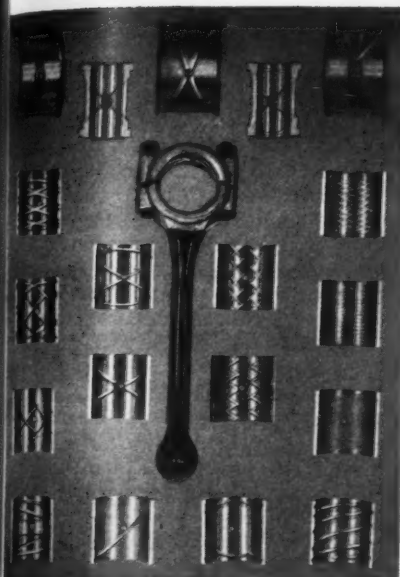
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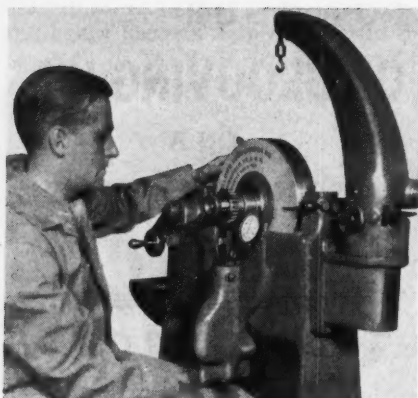


Fig. 9—Testing the involute curve on the teeth of a spur gear.

set up as the teeth pass through mesh, due to the sliding contacts of the rough surfaces. While no definite limits have been established for the finish on the surfaces of gear teeth, efforts are being made to determine a standard for rejecting gears which would prove unsatisfactory under operating conditions.

While it is not the function of this article to deal with the subject of machining processes nor with the question of noise, these two points are, nevertheless, closely allied with the question of inspection of gear tooth elements. It is possible with present-day gear cutting tools to produce gears such as shown in Fig. 6, which have a fairly smooth and accurate tooth surface, but as most gears, especially those for high speed operation, must be given some sort of heat treatment following cutting, errors are introduced which did not exist in the "green" gear.

In order to restore hardened gears to their original accuracy, various methods have been employed such as grinding and lapping the teeth. Where considerable distortion takes place in the hardening of gears which must operate smoothly, grinding presents a practical but rather costly solution to the problem. Where, however, it is possible to harden gears and hold the inaccuracies in tooth shape and spacing to within about 0.002 in., it is more economical and satisfactory to finish the gear teeth by lapping.

There are several different methods in use for accomplishing this operation. The previous accepted method consisted in running the gears together in pairs and introducing an abrasive compound between the teeth. This operation smooths the roughened tooth surfaces to some extent but does not correct distortions, and if carried too far, destroys the tooth shape. The reason is evident. If we consider that the only place where the lapping is accomplished is where the teeth slip upon each other, then the teeth will be lapped at all other points than in the vicinity of the

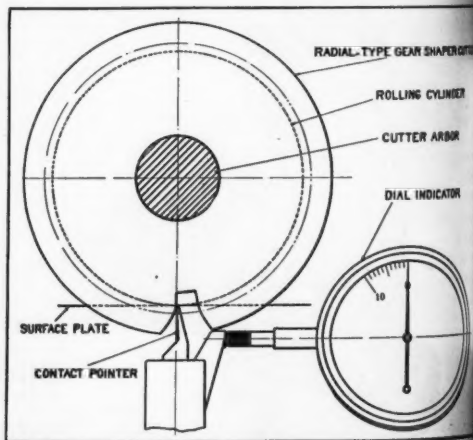


Fig. 10—Drawing illustrating principle upon which involute testing machine operates.



# Tips

## ON TOOL HARDENING TREATMENT

### Embossing Dies: A Good Test

There's hardly a fussier, more exacting heat treating job than the hardening of master embossing dies. The master die is of course pressed into blanks to form the production dies—and must be letter perfect. Very fine and delicate lines and sections are common and are very easily damaged by improper heat treatment. There can be no scale—there can be no soft skin—there can be no egg-shell—and there can be no crack up and chip off.



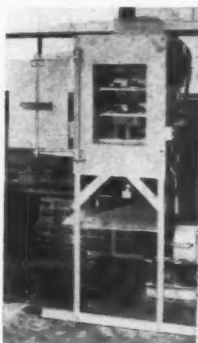
Hydriding furnace for hardening tools and dies in prominent die shop.

The treatment of embossing dies was a way somewhat of a problem at the Lindberg Steel Treating Co. Generally they were pack hardened—but the danger of picking up a brittle carbon case was always present—and such a circumstance would naturally reduce the life of the die. Even the slightest scale could not be tolerated, so heat treatment was always a question of six of one, half a dozen of the other.

Several weeks after the first Hydriding Furnace was put on the production line—it was decided to try this new hardening process on several embossing dies. That was considered to be the acid test. These particular dies were not master dies—but were of the circular type about 3" diameter x 5" long—covered with hand tooling and very costly. They were in the furnace about 2 hours—and there was an interested group around the quench tank waiting to see the results. One die at a time was quenched, and finally they were cool enough for a quick inspection before being placed in the tempering furnace. They were perfect—surfaces were just

as clean as before treatment—and later observation disclosed that no carbon had been picked up—nor lost in the surface of the die. Naturally the customer was elated with the job and the hardener likewise—that he had at last found a dependable method of hardening embossing dies.

Perhaps your hardening problem does not involve embossing dies—but if it requires clean scale free surfaces—with no soft skin—and no brittle egg-shell case then you should by all means check up on Hydriding. Just send us a sample which we can Hydryze and return to you—or write for Bulletin 91 descriptive of Hydriding.



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# Lindberg Furnaces



pitch line. The greatest amount of lapping is done, of course, where the greatest slippage takes place. Obviously, unless this operation is carefully conducted, satisfactory results are difficult to obtain.

The company with which I am connected has introduced a method for lapping hardened gears which overcomes the objections previously stated. By this method, the rotative motion of the work and lap has relatively little to do with actual lapping (except in changing the bearing length and its location), the lapping being done by a reciprocating motion. This method corrects slight errors without destroying the tooth shape. The lapping process has the additional advantage that it produces smooth working surfaces on the teeth, resulting in a reduction in friction and vibration, and hence assuring quieter operation.

#### Methods for Checking Gears

The method best suited to check-

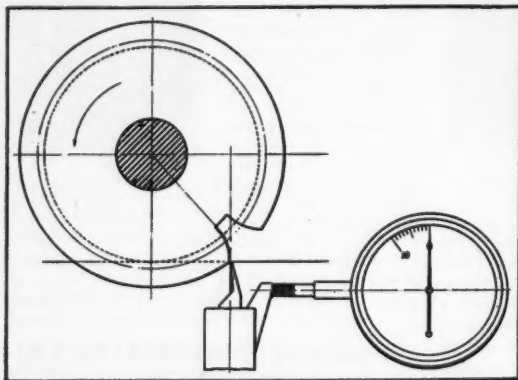


Fig. 11—Any deviation from true involute will be indicated by the needle.

ing gears is to a large extent governed by requirements. These can be divided into two distinct classifications:



Fig. 12—Involute tester in which involute cam is employed.

1. Checking an original design to determine if specifications have been adhered to, which would comprise principally a check on individual tooth elements.

2. Checking gears produced in quantities where manufacturing tolerances must be adhered to and errors are considered in combination rather than separately.

Obviously, if only one gear of a kind is to be made, it should be treated in the same manner as the original design and an accurate check made of various tooth elements. However, the gear is

to be produced in quantities, then devices capable of determining cumulative errors would be employed. Devices which fulfill

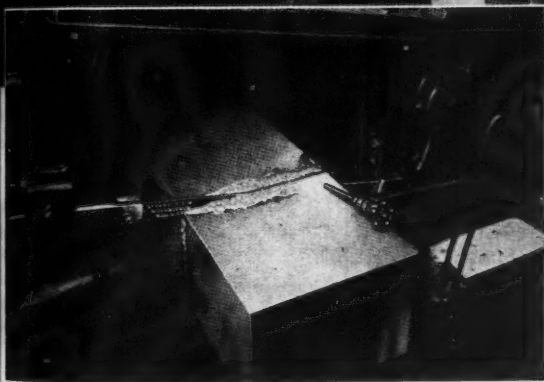
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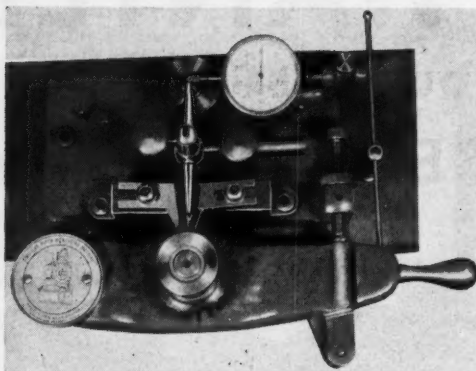


Fig. 13—Circular pitch testing fixture.

quirements to be met under the first classification include gear tooth calipers, templets, pin gages, and so on. In the second classification would be testing fixtures employing needle indicator or dial gages, master gears in combination with recording devices, and so on.

From the standpoint of inspection, the four most important elements in the order of their importance are tooth shape, tooth spacing, tooth thickness, and concentricity. Helical gears introduce a fifth element; helix angle.

#### Checking Tooth Shape

Most gears in use are of involute tooth shape, and checking the involute is a comparatively simple operation. The involute is that curve traced by a point in a string as it is unwound from a cylinder, the cylinder being known as the base circle. This is illustrated diagrammatically in Fig. 7. If the string is kept taut as it is unwound from the disc, the pencil point will trace an involute curve. Any apparatus employing this fundamental principle naturally will assure the most accurate and reliable means for checking tooth shape.

A machine employing this fundamental principle is shown in Fig. 8.

This is known as an Involute Testing Machine, and operates as follows: Two straight edges are attached to a pedestal and are located in exactly the same plane. Two cylinders, of the same diameter as the base cylinder from which the involute is generated, roll on the straight edges. These cylinders are held on an arbor, a handle being provided to facilitate turning in the manner shown in Fig. 9. The head is mounted slightly out of balance, so that as soon as the stop is released and drawn it starts rolling along the straight edges, the operator controlling the speed of rolling by slight pressure of his hand.

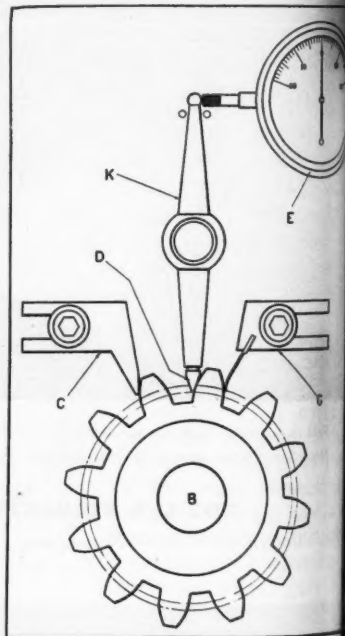
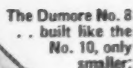
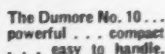


Fig. 14—Drawing illustrating principle of circular pitch testing fixture.

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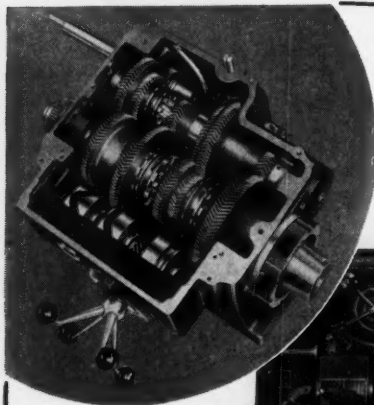


Fig. 15—Gear measuring machine designed on same principle as circular pitch testing fixture.

In the central plane, and at the point of origin of the involute, is located a contact pointer, Fig. 10, to trace the curve on the gear tooth. This pointer through suitable arrangements operates a  $1/10,000$  in.

dial indicator without multiplication. It is obvious that as the base cylinders roll along the straight edge without slippage, any movement of the indicator needle indicates a deviation from the true involute, shown in Fig. 11. This is a basic principle and is employed where extreme accuracy is desired in the checking of tooth shapes.

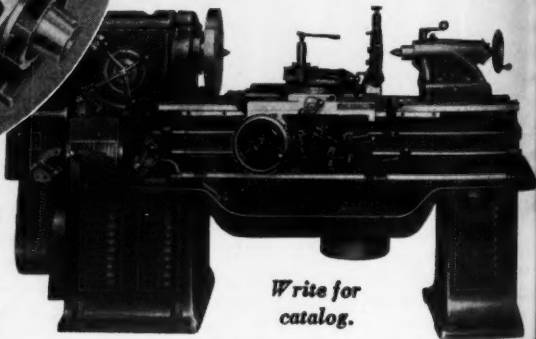
Another method is shown in Fig. 12. While the principle used here is fundamental, it is applied in a slightly different manner. A master involute cam rather than base cylinder is employed and the testing fixture is controlled by the master involute cam and guide bars. As the testing fixture is moved about on the table with the involute master in intimate contact with the guide bars, any variation of the involute being checked from that of the master is reflected in a movement of the indicator needle. The gear measuring machine is part



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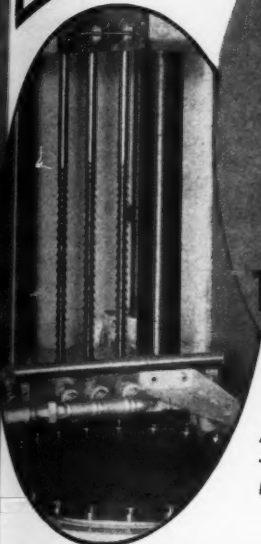
March

# Which is Your Problem?

A FEW  
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OR  
HUNDREDS  
OF  
THOUSANDS



Above: Low Production broaching of model engine cylinders on low-cost Colonial Light Duty Press.



At Left: Finish broaching and burnishing of bores in wrist-pins—1400 per hour on a Colonial Utility hydraulic broaching press with automatic indexing table and continuous operation.

no jobs—both requiring accurate and smooth finishing of round straight bores. A few hundred at a time in one case. Steady production at 1400 per hour in the other. In the first case, broaching proved to be the most economical method of obtaining the high accuracies required. In the other, not only reduced costs, but licked fatigue failure of those highly stressed parts by

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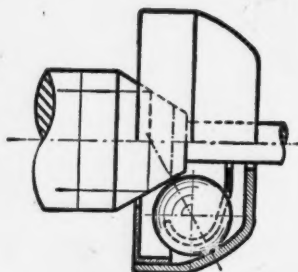
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larly adaptable to checking gears is easy to operate.

### Checking Circular Pitch

Tooth spacing or circular pitch can be checked very readily on a fixture generally termed a Circular Pitch Testing Fixture, shown in Fig. 16. This device has a fixed stop against which the gear tooth is brought



Fig. 16—Fixture for checking circular pitch of internal gears.

bear, and a movable pointer connected with a dial indicator which contacts the adjacent side of the following tooth. The principle is illustrated diagrammatically in Fig. 14. The gear is held on stud B, carried by a fulcrumed arm. One side of the gear is brought into contact with a fixed stop C, being held against this stop by spring block G. The contact point D carried in lever K is brought into contact with the adjacent side of the following tooth. Any errors in tooth spacing are registered



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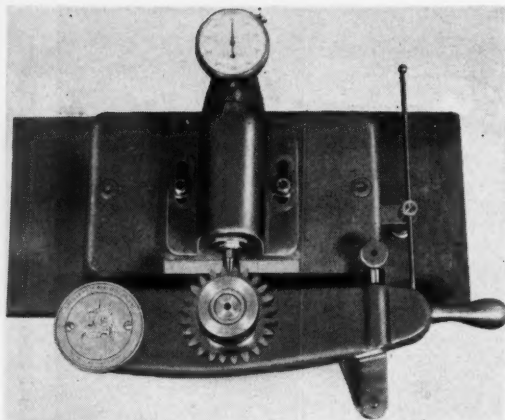


Fig. 17—Cone point testing fixture.

diameters, within a certain range, by means of an adjustable stop located at the rear of the bracket.

#### Tooth Thickness, Backlash and Center Distance

Tooth thickness, backlash and center distance all bear a direct relation to each other. Where two gears having the same number of teeth are to operate to-

gether, backlash is generally provided for by thinning the teeth of both gears an equal amount. Where one gear is much smaller than the other, it is the practice to leave the teeth of the pinion standard thickness and provide for backlash by thinning the teeth on the gear. This is the recommended practice where both are made from the same

on the dial indicator E, which is operated by lever K. All of the teeth of the gear are checked by withdrawing the fulcrumed arm and indexing the gear on the stud.

This same principle is applied on the Gear Measuring Machine shown in Fig. 15. The fixture is fulcrumed to the table to which a stop is also clamped. The fixture carries a contact pointer, stop and spring finger that fulfill the same functions as similar members on the fixture previously shown.

The circular pitch checking devices described above are applicable to external gears only. Fig. 16 shows a fixture for checking the circular pitch of internal gears. The same principle for mounting the contact pointer is employed, and the entire apparatus is attached to a swinging arm which can be elevated to permit removal and insertion of the work. The position of this arm can be definitely set to check gears of various

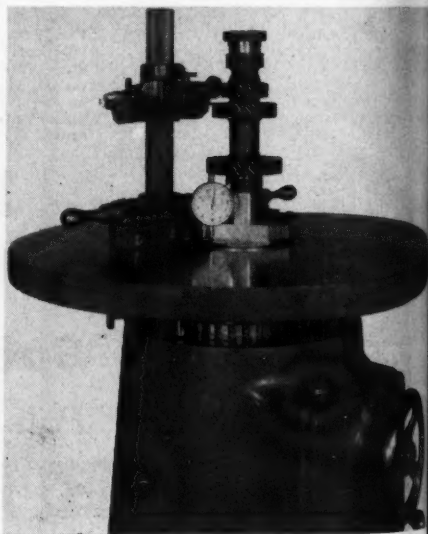


Fig. 18—Checking helix angle of helical gears by sine bar method.

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Fig. 1641  
Pat. App. For

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on the**

**UNBRAKO**

**Self - Locking  
Square - Head  
Set Screw, too!**



Fig. 1646  
Pat. App. For

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material, as it tends to more nearly balance the strength of the teeth in gear and pinion.

There are two methods of measuring backlash; one by the use of a feeler gage placed between the teeth when they are located at the required center distance, and the other by

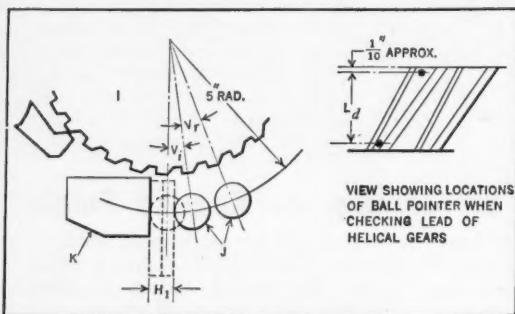


Fig. 19—View showing locations of ball pointer when checking lead of helical gears.

bringing the teeth into intimate contact and then determining the difference between the standard and measured center distance. This last check does not indicate backlash directly, but it can be determined by the following formula:

$$B = 2 \tan. VP \times d$$

In which:  $B$  = Backlash in inches

$VP$  = Pressure angle

$d$  = Difference between standard and measured center distance.

## Checking Concentricity

Concentricity of the pitch circle can be checked by a device known as Cone Point Testing Fixture shown in Fig. 17. The gear to be checked is held on a fixed stud upon which it is free to rotate. The stud is retained by a fulcrumed arm. The cone pointer is held in a spring-actuated plunger, this plunger contacting the pitch circle of the dial indicator. The cone pointer is located in the tooth spaces and any errors in concentricity are reflected directly on the indicator.

## Checking Lead of Helical Gears

In checking helical gears an element not present in spur gears is introduced. The teeth are not parallel

with the axis, but are located in an angular relation to it. In order to obtain the best results from helical gears that operate on parallel axes it is imperative that tooth contact between mating gears extend across the face width of the gears, necessitating that the helix angle of mating gears be held within close limits.

In checking this element of helical gear teeth, the sine bar method is generally employed as shown in Fig. 18. Two settings are required; one

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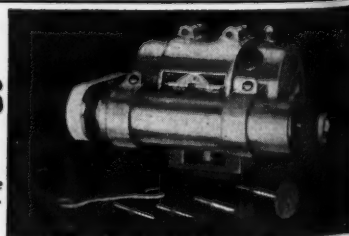
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March, 1939



**THESE  
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## Plant Foreman Gives low-down

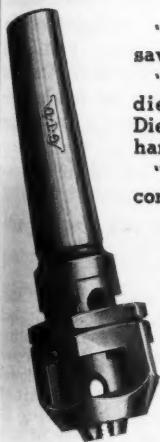
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# GREENFIELD



March, 1939

MODERN MACHINE SHOP

93

with the pointer on the fixture located about 1/10 inch from the upper end of the tooth, as shown in Fig. 18, and the second setting at a similar distance from the lower end. The fixture is fulcrumed to the table, the pointer holder is adjusted to bring the pointer in the correct position near the top of the tooth, and the stop on the table is set to bring the pointer in the vicinity of the pitch line. A gage block 0.100 in. thick is placed under the indicator plunger and the needle is set at zero.

The next step is to set the machine for the second setting, but before doing so it is necessary to determine the arc (see Fig. 19) through which the table should be rotated, as well as the height of the work with relation to the pointer. The angular setting is obtained by the following formula:

$$Vr = L_d \times \tan V_h \times 114.59156$$

PDg

in which: Vr = Angle of revolution of table

Ld = Linear distance through which lead is tested

Vh = Helix angle of gear

PDg = Pitch diameter of gear

Example: Let Ld = 0.600 inch; Vh = 30 degrees; PDg = 4 inches — then:

$$Vr = 0.600 \times .57735 \times 114.59156$$

4

= 9 degrees, 55 minutes, 26 seconds.

The machine is provided with an

index plate having 36 notches. One notch is selected, equalling 10 deg. The difference, or angle Vi (Fig. 19), between the required angular rotation Vr and 10 deg. is 4 minutes 26 seconds. This difference is made up by the use of gage blocks, the thickness of which is determined by the following formula:

$$H_1 = \text{Sine Vi} \times 5$$

In which:  $H_1$  = Thickness of gage blocks necessary.

Vi = Difference between required angle of rotation and one notch on index plate.

5 = Center distance of fixed stop in table.

$$\text{Then: } H_1 = 0.00132 \times 5 = .0066 \text{ inch.}$$

The gear shown has a left-hand helix, so for the first setting the stud is located against the stop block. If the gear had a right-hand helix, the first setting would be made with the gage blocks in place and the second setting with them removed.

In making the second setting, Fig. 19, the fixture is withdrawn from the gear, after which the work is elevated and a gage block (in this case 0.600 in. plus the 0.100 in. block used in the first setting) is placed under the indicator plunger and top of the quill. The table is then positioned rotatively and gage block  $H_1$  (in this case .0066 in. thick) is placed between the stud and fixed stop. If the needle registers zero in the second setting, the lead of the gear is correct.

(The second half of this article will be published in the April issue.)

The Dandy Guide Post. Dandy Machine Specialties, Inc., 2112 South 52nd Ave., Chicago, Ill., is now distributing a chart which presents on the obverse side, drill and reamer sizes for dowel pins, and on the reverse side, a chart of Dandy Precision Dowel Pin sizes in standard and oversizes. Copies of this chart are available upon request.



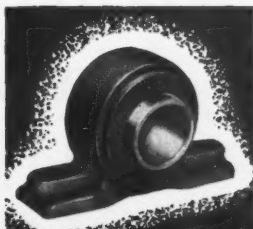
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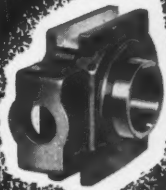
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March, 1939

MODERN MACHINE SHOP

97

# Baldwin-Southwark Plant Designed for Massive Work

*Concluding section of this article, describing the machining of parts for great turbines, engines, and other huge units.*

By HOWARD CAMPBELL  
Editor, Modern Machine Shop

**T**HE job shown in process in Fig. 9 is that of grinding the bearing diameters on columns for a 3,500-ton oil-operated press which was built in this plant for the forming of metal aircraft parts. The columns are steel forgings, 20 in. diameter x 23 ft. long.

The machine is a 30-in. x 24-ft. cylindrical grinder equipped with

a 30 x 3-in. grinding wheel. Operating with a 1½-in. feed and at a speed of 25 ft. per min., 0.003 in. of stock is removed with each pass of the wheel. Although of unusually large diameter, as can be seen from the illustration, the diameter is held to within plus or minus 0.001 in. of the drawing dimension.

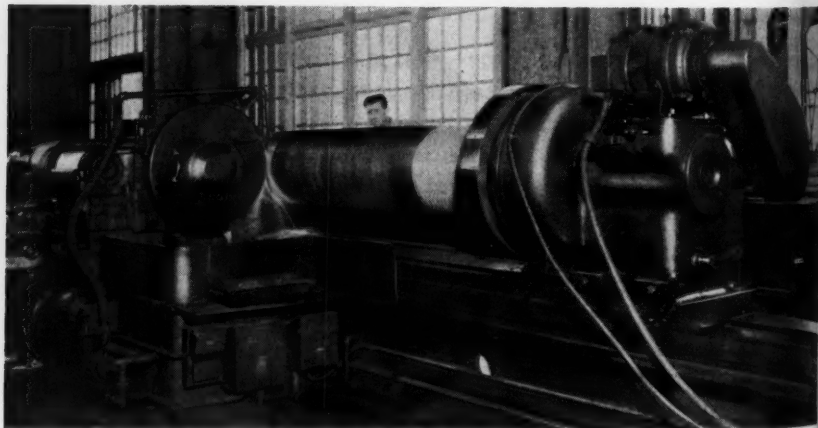


Fig. 9—Grinding bearing diameters on columns for a 3,500-ton hydraulic press. The machine is a 30-in. x 24-ft. cylindrical grinder

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Fig. 10 — Turning pins and bearings on crankshaft for an 8-cylinder, 1,000 h.p. Diesel engine.

(Nesmith photo)

work. The carriage, carrying the housing in which the tool rest ring revolves, feeds longitudinally on the bed of the machine, carrying the tool slide and revolving ring mechanism with it.

Illustrated in Fig. 10 is the operation of turning the pins and bearings for an 8-cylinder, 240 r.p.m., 1,000 h.p. De La Vergne Diesel Engine, built in the Baldwin-Southwark shops for the Municipal Light and Power Company's plant at Forest City, Ark. The crankshaft, although held between centers for alignment, is anchored in a stationary position while the cutting tool, which is clamped to a slide rest attached to a revolving ring, revolves about the

Fig. 11—Machining the holes in the head cover for a 115,000 h.p. hydraulic turbine for Boulder Dam.

(Nesmith photo)

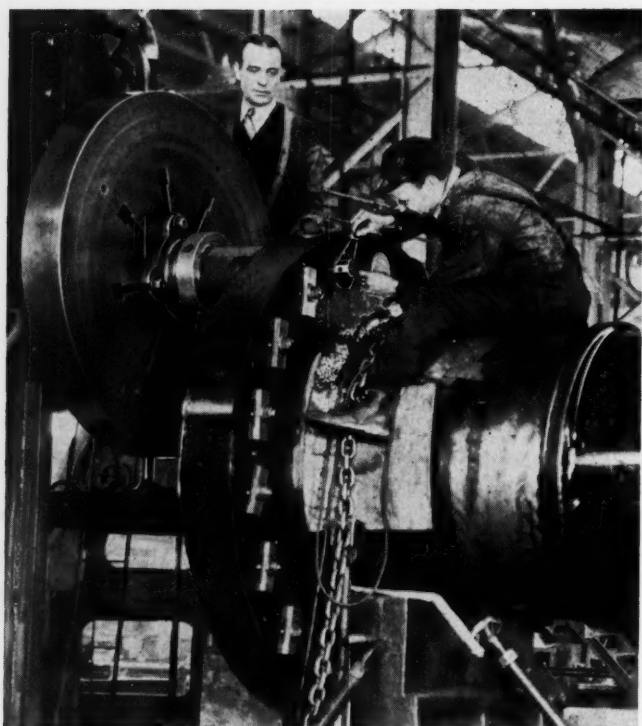


Fig. 12—Drilling and boring the bolt hole in the flange of a large hydraulic turbine shaft. No play is permissible between the mating members; the holes must be bored and reamed to close limits for size and center distance.


(Nesmith photo)

Means are provided for setting the tool to the depth of cut desired while the machine is in operation, the movement of the tool being controlled by the hand wheel shown in the illustration. Baldwin-Southwark is equipped not only to machine these huge

type boring machine, which makes it possible to machine more than half the holes at one setting. After laying out or marking off the work, it is a simple matter to shift the machine on its ways and raise or lower the spindle as required in order to drill

forged steel crankshafts, but also produces them in its own forge shop.

The operation shown in process in Fig. 11 is that of boring and counterboring the holes in the head cover for a 112,000 h.p. hydraulic turbine for Boulder Dam. Here the job is shown set up on a horizontal floor-



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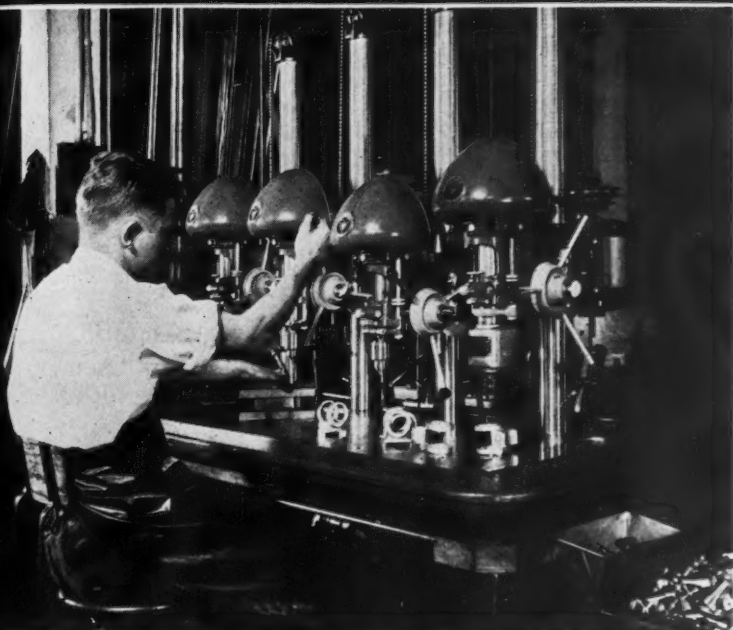
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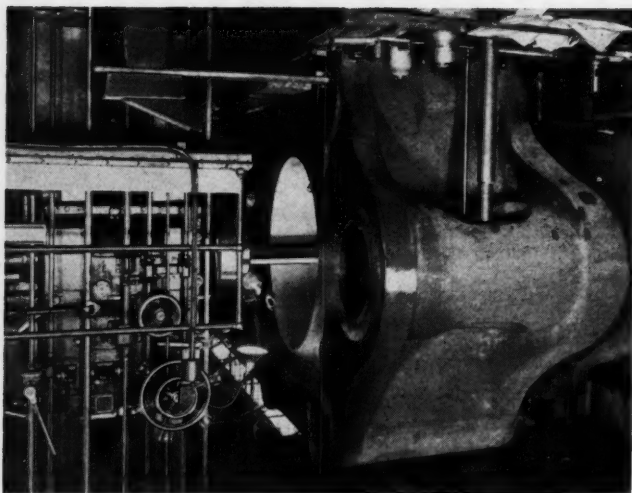


Fig. 13 — Boring cylinder for a 4,000-ton extrusion press. The casting weighed 200,000 lbs. and the finished bore is 39 in.

and bore the hole in the proper location.

Such jobs as this often require tools of special design, which are produced in the forge shop or toolroom of the Baldwin - Southwark plant. The Baldwin - Southwark manufacturing organization includes engineers who not only can help the customer to work out his problems of design, but who also have the practical knowledge which enables them to design tools to

boring machine is used with which all of the holes can be drilled and bored at one setting of the work. On such a shaft the holes must be drilled to very close limits of accuracy and

expedite the work.

The operation of drilling and boring the holes in the flange of a large hydraulic turbine shaft is shown in Fig. 12. Here again, a horizontal floor-type

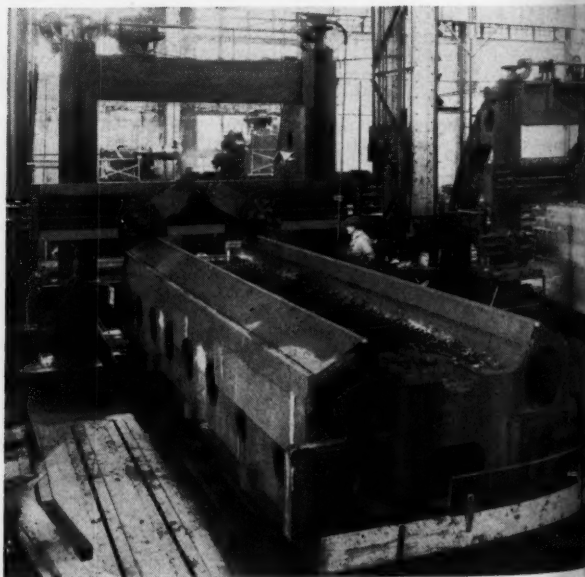


Fig. 14—Planing the bed ways of a base plate casting for a 3,500-ton extrusion press.



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**COMET**

is customary to ream the flange in place with its contacting part so that the bolts will be tight fits in their respective holes. This is a point upon which naval engineers and inspectors are very particular.

Some idea of the immense size of the hydraulic presses built by Baldwin-Southwark can be gained from the illustration Fig. 13, which shows the operation of boring a cylinder for a 4,000-ton extrusion press. The casting weighs 200,000 lbs. and the size of the finished bore is 59 in. To be machined in the same operation are the 16-in. column holes either side of the bore. As shown, this work is done by a horizontal type boring and milling machine, the bed of which is set into the floor. The bed of this machine is 75 ft. long and the spindle can be raised to a height of 20 ft. from the bed, making the machine adaptable for use on the largest castings that can be handled.

The base plate casting for a 3,500-ton extrusion press is shown in process of machining in Fig. 14. The machine is a 12-ft. planer and the illustration shows the tool heads set at an

angle so that the bed of the press can be machined at an angle by power feed. The planer is especially built for extra heavy work and is of the most modern type, with centralized control.

The workmen shown in Fig. 15 are using portable pneumatic grinders to finish the surfaces of the bronze blades on a four-blade propeller for an ocean steamship. This propeller is a typical example of the variety of work turned out by the Baldwin-Southwark shops. Using flat emery discs operating at a speed of 1,500 r.p.m., the surfaces of the propeller are smoothed to a high gloss finish to reduce friction in the water to the minimum and prevent the adherence of foreign matter. These three workmen spend some 24 hours polishing this casting in order to smooth the surface to a point that will pass the inspector's critical eye.

The plant described in the foregoing article is a splendid example of American industry—a plant that has grown consistently as a result of keeping pace with progress in a progressive age.

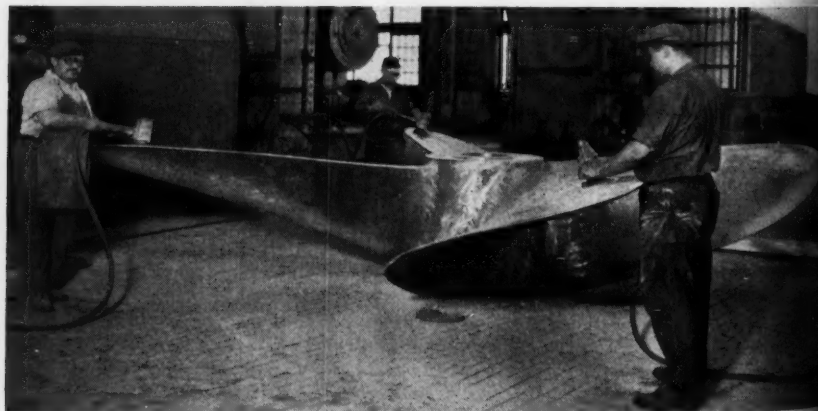
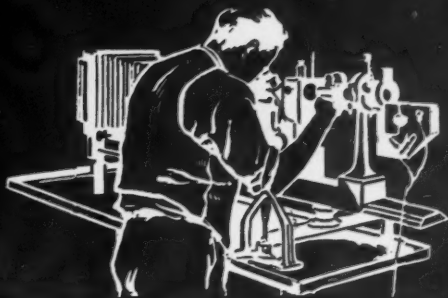


Fig. 15—These workmen are polishing the surfaces of the bronze blades on a four-bladed propeller for an ocean steamship. Air grinders are used for this operation.

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**CRUCIBLE STEEL COMPANY**

**of America**

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THOMAS' REGISTER FOR NEAREST OFFICE

**MAKERS OF HIGH SPEED TOOL, STAINLESS,  
PRODUCTION AND SPECIAL PURPOSE STEELS.**

IN the early days of the machine age an engineer designed a product and turned it over to the production man to build. The latter made his patterns, whittled out the parts as best he could, figured up his costs and handed the product to the sales department to sell. Price was determined after—not before—production started.

The salesman's job was not too hard. The products which the "machine" had made possible inevitably were so much lower in price than the previously hand-made articles—if prototypes existed—that any factory which was able to turn out a large number of products ahead of others was almost bound to be successful in its sales efforts. Industry then enjoyed a buyer's market.

As the manufacture of machine-made products became more common and competition developed, the necessity arose for a new industrial science—the science of economic production. In order that more and more people might enjoy more and more comforts and conveniences, costs had to be as low as possible. Industry began to recognize that production planning and costing had become as necessary as the engineering which conceived or the manufacturing which actually produced the article.

Out of the ranks of the production division came a group of men on whom these new responsibilities were placed. They were men who understood machines; men who knew their capabilities and their limitations; men who could visualize the evolution of a finished article from raw materials as a series of manufacturing operations; men who could figure to a fraction of

# What Is a Tool Engineer?

By WALTER F. WAGNER  
President, American Society of Tool Engineers

a cent what it would cost to do the same job this way or another; men who could conceive and design new machines, new equipment, or new tools to do some job that could not be done with the equipment available.

This new, practical scientist of industry we have come to call a Tool Engineer. He is the organizer of the batteries of machines, tools and equipment that characterize modern industry. He knows their idiosyncracies and capabilities. It is his job to fit each one into its proper place so that the whole may operate smoothly under the field generalship of the manufacturing division; executives and workmen alike. He must select the right processes and the right equipment. He must see that each machine is properly provisioned with the right kind of tools and fixtures so that it can carry out its particular assignment effectively.

He is industry's new manufacturing strategist who, more and more, is becoming the final judge as to whether a new idea is economically feasible. When he has made his decision, his, frequently, is the responsibility of showing how the desired end can be attained.

He is industry's unsung "man behind the scenes." It is on him that

the problem devolves of converting an engineer's conception into not only a produceable, but also a saleable reality. His problem in most cases requires far more inventive ability and engineering ingenuity than the design of the product or unit to be produced. His is the responsibility of determining how to produce industry's products at lower and still lower costs. His is the job of keeping prices down while costs of labor and raw materials continue to rise.

Without him, the best engineered product might never reach the market, or if it did, it might languish on dealers' shelves because of too high a cost. Without his knowledge, machines, equipment, and tools might well be so many tons of cold and idle metal.

His is not the glory that goes to the sales manager when sales climb. His is not the recognition that goes to the production executive who has turned out so many more of the same product without a serious hitch, nor the praise accorded to the management able to reduce prices while increasing profits to investors.

Unfortunately he is classified within the ranks of the non-productive help, in the bracket of "overhead"—a burden which industry always endeavors to curtail. More often than not his only satisfaction is in a job well-done, or a tough production problem licked, or a few cents or dollars saved on each part here or there, or a new way of processing a product leading to decreased costs, greater accuracy, higher efficiency.

Hard-headedly practical and intensely serious by nature, it was the Tool Engineer himself who a few years ago decided that he needed a new kind of a technical society; an organization where Tool Engineers could meet and interchange ideas and information of value.

Thus, back in 1932, during the nation's worst depression, the A. S. T. E. was born with 33 members. At first its growth was slow, being confined largely to that heart of mass production industries; Detroit. Then, as word spread of the society's activities, applications from groups of tool engineers began to come in from different sections of the country.

In 1935 the first outside chapter was chartered, in Racine, Wis. Other chapters followed, reaching into New England in the East, St. Louis in the South, Minneapolis in the North. By the beginning of 1937 there were some seven chapters. That year the membership doubled, and seven new chapters were organized.

Nineteen thirty-eight has proved to be a repetition of the previous year. Again membership doubled and the number of chapters jumped to 25, including two Junior chapters in Detroit and Cleveland. And this is just a beginning. Before this appears in print, at least one more chapter is to be added while others are in the process of formation.

The Society has its own National Headquarters in Detroit, with Ford Lamb, one of the Society's past presidents, as Executive Secretary. It has its own publication, "The Tool Engineer," but it differs from other organizations in that the A. S. T. E. is really run by its membership.

As in the daily work of Tool Engineers, activities of the A. S. T. E. are not built on precedent. Thus, last year, it decided to stage a Machine and Tool Progress exhibition at a time when business was apparently on the skids, and all the odds were against such a show being successful. The success of that show is now history: How thousands came from all parts of the country to see and buy products of some 160 exhibitors.

It was merely a spur to greater



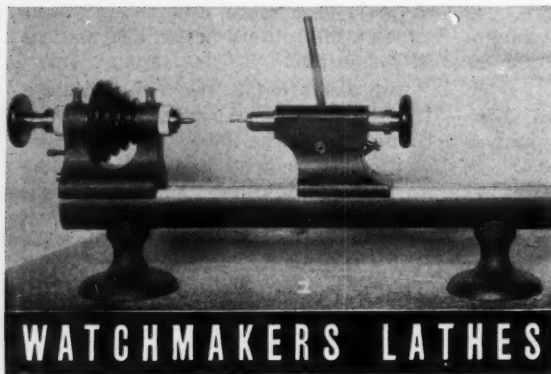
activities. This year, in addition to staging another and greater Machine and Tool Progress Exhibition, the Society has launched upon one of the most important projects ever undertaken by an engineering society: An investigation into the relationship of the machine on employment and standard of living.

In engaging on such a program, the A. S. T. E. feels that it is doing no more than might be expected. Its members feel that the A. S. T. E. has a definite responsibility to society at large as its individual members have to the industries and companies which they serve. The A. S. T. E. is not seeking the limelight; it merely feels that here is a problem to which Tool Engineers by virtue of their knowledge, training, and experience can probably find the right answers quicker than others. That they would undertake such a program with vigor

was never questioned, somehow one expects that sort of thing from a **TOOL ENGINEER.**

**Sellers Machine Tools.** The complete line of machine tools built by William Sellers & Company, Inc., 16 Hamilton St., Philadelphia, Pa., is described and illustrated in an 8½ x 11-in. catalog now being issued by this company. The line includes Sellers table type horizontal boring, drilling and milling machines with Sellers unit head, Sellers planer type and floor type horizontal boring, drilling and milling machines, the Sellers planer with the Sellers spiral gear drive, the Sellers openside planer with complete electric feed and traverse control, Sellers planer type milling machine with standard milling heads, Sellers boring mills, Sellers tool grinders, Sellers drill grinders in three types for average and large drills, Sellers bench type drill grinder for drills ½-in. size or less, and Sellers railroad tools including the Sellers car wheel lathe, driving wheel lathe, car wheel boring machine and driving box boring and facing machines.

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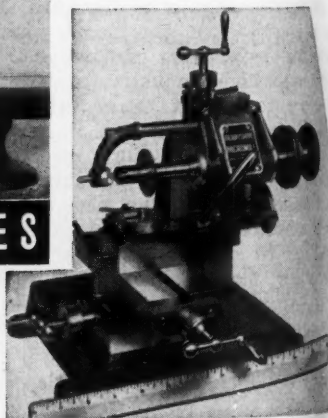
Elect

15" and 18" Beds, Swing 4.724"

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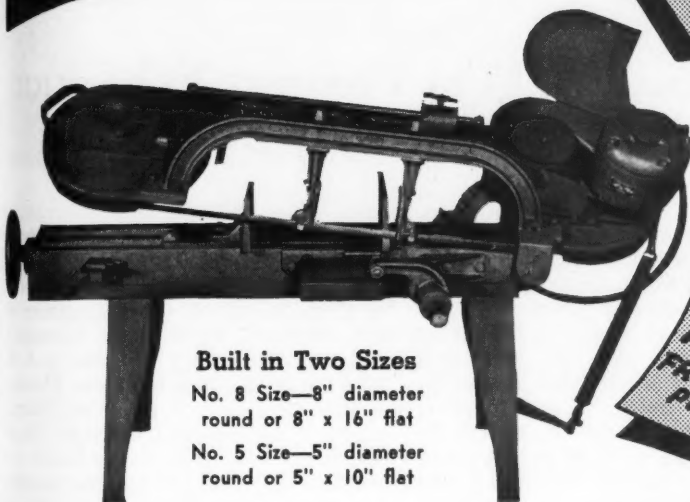
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Small Work



Here's the **SAW** you need



**Built in Two Sizes**

No. 8 Size—8" diameter  
round or 8" x 16" flat

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round or 5" x 10" flat

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**W**HEN it comes to handling today's metal cutting jobs, Wells has the saw to do the job! Bars—tubes—sheets—angles—any shape—can be cut quickly, accurately and economically—if you "Saw it the WELLS Way." And remember—Wells Saws offer a *minimum* of upkeep cost, proved from years of service on all kinds of metal cutting jobs.

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**WELLS**

**METAL CUTTING BAND**

**SAWS**

**THREE RIVERS, MICH.**

# Second Annual Meeting American Society of Tool Engineers and Machine and Tool Progress Exhibition March 14, 15, 16, 17, 18, 1939

**T**HE Second Annual Convention of the American Society of Tool Engineers will be held at the Convention Hall, Detroit, Mich., from March 14th to 18th inclusive, at which time the Second Machine and Tool Progress Exhibition will also be presented. Contracts for exhibition space received up to time of going to press indicate that the exhibition will be twice as large as it was last year.

Attendance will be restricted this year to those who have a definite business interest in the exhibition and technical meetings. However, anyone who is sufficiently interested to do so can obtain an engraved invitation from any one of the exhibitors, or will be admitted upon payment of a 50-cent registration fee at the door.

There will be no day-time sessions of the Society; thus members will be free to visit the exhibition as well as to make trips to some of the major industrial plants in the Detroit area.

Monday, March 13th, is set aside for a preview meeting and dinner sponsored by the American Society of Tool Engineers for members of the Society and industrial leaders. The general opening of the convention will be Tuesday morning, and the evening will be free. The first technical ses-

sion, which will be held Wednesday evening, will be devoted to "A Symposium on Mechanical Surface Finishing." This session will be conducted by Carl J. Oxford, Chief Engineer of the National Twist Drill Company, and the discussion will be led by J. R. Weaver of the Westinghouse Electric & Mfg. Company. A paper on "Grinding" will be read by Ira Snader, Chief Engineer, Ex-Cell-O Corporation; the subject of "Honing" will be covered by Kirk Connor, President, Micro-matic Hone Company; "Lapping" will be discussed by H. J. Griffing, Norton Company; "Diamond Boring and Finishing" will be discussed by F. T. Ellis, Heald Machine Company; an exposition of "Superfinishing" will be presented by D. A. Wallace, President, Chrysler Division, Chrysler Corporation, and "Measurements of Surface Finish" by the use of modern instruments will be discussed by Dr. Ernest Abbott, President, Physicists Research Company.

The Annual Dinner of the A. S. T. E. will be held at 6:30 Thursday evening at the Book-Cadillac Hotel. At this meeting reports of national officers will be received and the new national officers will be installed. The name of the speaker had not been announced



**WALTER F. WAGNER**  
President, American Society  
of Tool Engineers



**JAMES R. WEAVER**  
1st Vice President, A. S. T. E.



**GEORGE A. SMART**  
2nd Vice President, A. S. T. E.

## Officers of the American Society of Tool Engineers



**CHARLES F. STAPLES**  
Secretary, A. S. T. E.



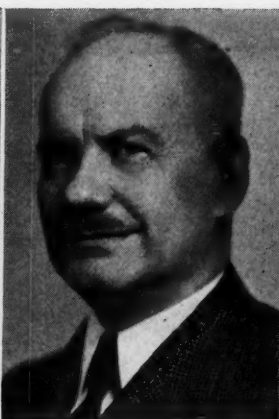
**FRANK R. CRONE**  
Treasurer, A. S. T. E.



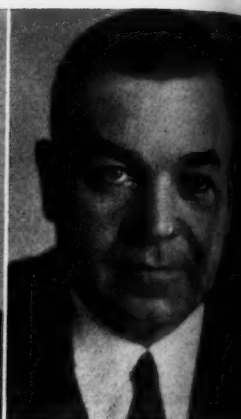
**FORD R. LAMB**  
Executive Secretary,  
A. S. T. E.



**W. F. SHERMAN**  
Vice Chairman of Program  
Committee for Annual  
Convention.



**IRA SNADER**  
Chief Engineer, Ex-Cell-O Corporation. Mr. Snader will discuss Surface Grinding.



**H. J. GRIFFING**  
Norton Company, who will discuss lapping at the Surface Finishing Session.

at the time of going to press.

The second technical session will be held Friday evening, the subject being "New Developments and Their Effect on the Tool Engineer." The chairman of the meeting will be Chris Borneman, Supervisor, Tool and Gage De-

partment, General Electric Company. In this session the following papers will be presented: "Hydraulic Units," by K. R. Herman, Vice President, Vickers, Inc.; "Gages," by C. Johnson of Pratt & Whitney Company; "Cutting Tools," by L. C. Gorham, Gorham



**D. A. WALLACE**  
President, Chrysler Sales Corporation, will present a paper on super-finishing developments.



**KIRKE W. CONNOR**  
President, Micromatic Hone Company, will discuss honing.



**CARL J. OXFORD**  
Chairman of the Surface Finish Session.

"...shaves over 300 gear types

with only  
14  
cutters..."



Using Michigan 860 type gear finishers, FULLER MFG. CO., producers of bus, truck and industrial transmissions, and special gearing, has found that with but 14 cutters it can shave every one of its more than 300 "active" gear types at a lower cost than for finish hobbing or shaper-cutting... while obtaining the greater quietness, greater accuracy, longer life, and faster production, which characterize MICHIGAN-shaved gears.

Combined set-up time for gear shaver and MICHIGAN gear checking equipment for each new run at Fuller, averages only 30 or 45 minutes, depending on whether or not cutters are changed.

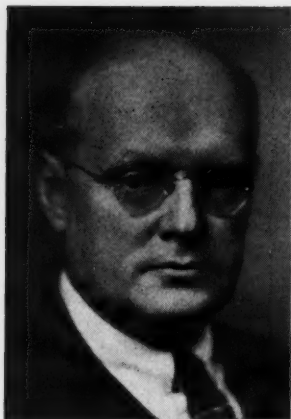
Regardless of your production quantities, if you are interested in better gears at a lower cost, it will pay you to investigate MICHIGAN gear finishing equipment.

*Bulletins available on Rack-shavers (high production); 860 shavers (job lots); Checking equipment; lapping machines; Cone area-contact worm gearing; gear cutting tools.*

MICHIGAN TOOL COMPANY, 7171 E. McNichols Rd., Detroit

March, 1939

MODERN MACHINE SHOP 117



**F. T. ELLIS**  
Heald Machine Co., will  
talk on Diamond  
Boring.



**HAROLD G. MOULTON**  
President, The Brookings Insti-  
tution, and featured speaker at  
the preview dinner on March 13.



**L. CLAYTON HILL**  
Works Manager, Murray  
Corporation, Toastmaster  
of Preview Dinner.

Tool Company; "Gear Tooth Finish-  
ing," by R. Drummond, National  
Broach & Machine Company, and "Ef-  
fect of Lapping or Honing of Cutting  
Edges of Tools," by John Lindegren,  
Crompton & Knowles Loom Works.

The exhibition will open at 9:00  
a. m. and close at 6:00 p. m. on Tues-  
day, Thursday and Saturday, and will

be open until 10:00 p. m. on Wednes-  
day and Friday. Plant inspection tours  
are arranged for 9:30 a. m. on Tues-  
day, 1:30 p. m. Wednesday, 1:30 p. m.  
Thursday, 1:30 p. m. Friday, and a  
tour of Greenfield Village at 9:30 a. m.  
Saturday. Arrangements for partici-  
pation in these tours can be arranged  
at the registration desk.

## Harold Glenn Moulton to Speak at Preview Dinner

Harold Glenn Moulton, President,  
The Brookings Institution, Washing-  
ton, D. C., is to be the featured  
speaker at the preview dinner pre-  
ceding the opening of the Machine  
and Tool Progress Exhibition in De-  
troit, on March 13th. The dinner, spon-  
sored by a group of leading indus-  
trialists, including K. T. Keller, Presi-  
dent, Chrysler Corporation; W. S.  
Knudsen, President, General Motors  
Corporation, and Alvan Macauley,  
President, Packard Motor Car Com-

pany, in co-operation with the Amer-  
ican Society of Tool Engineers, has  
as its topic "The Effect of the Devel-  
opment of the Machine on Employ-  
ment and Standard of Living."

The Fact Finding Committee of the  
A. S. T. E., which under the direction  
of Professor John M. Younger, Ohio  
State University, has been studying  
the relation of the machine to em-  
ployment and standard of living, will  
present its preliminary report at this  
dinner.



# NATIONAL METAL CUTTING TOOLS AT WORK

Quality and Correct Drill Design always are requisites for economical drilling of Oil Holes in Automotive Crankshafts such as this.

NATIONAL Drills were selected again on a time and cost per hole basis.

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TWIST DRILLS  
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SPECIAL TOOLS

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# Meeting Tool Room Requirements

## NORTON DIAMOND WHEELS

**F**OR grinding the cemented carbides there are two outstanding Norton Diamond Wheels—the Resaloy Wheel and the new Metal Bonded Wheel—each with distinctive features. Together they make it possible to meet the individual requirements of any job.



## The Norton

**E**XCEPTIONAL abrasion resistance, fast dressing—that's the patented Norton "B" life and fast cutting ability of tool room men everywhere. Both long life and fast cutting are a result of the strength of the wheel—a strength that is the result of the kiln between abrasive

## NORTON COMPANY

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## the NORTON WHEEL

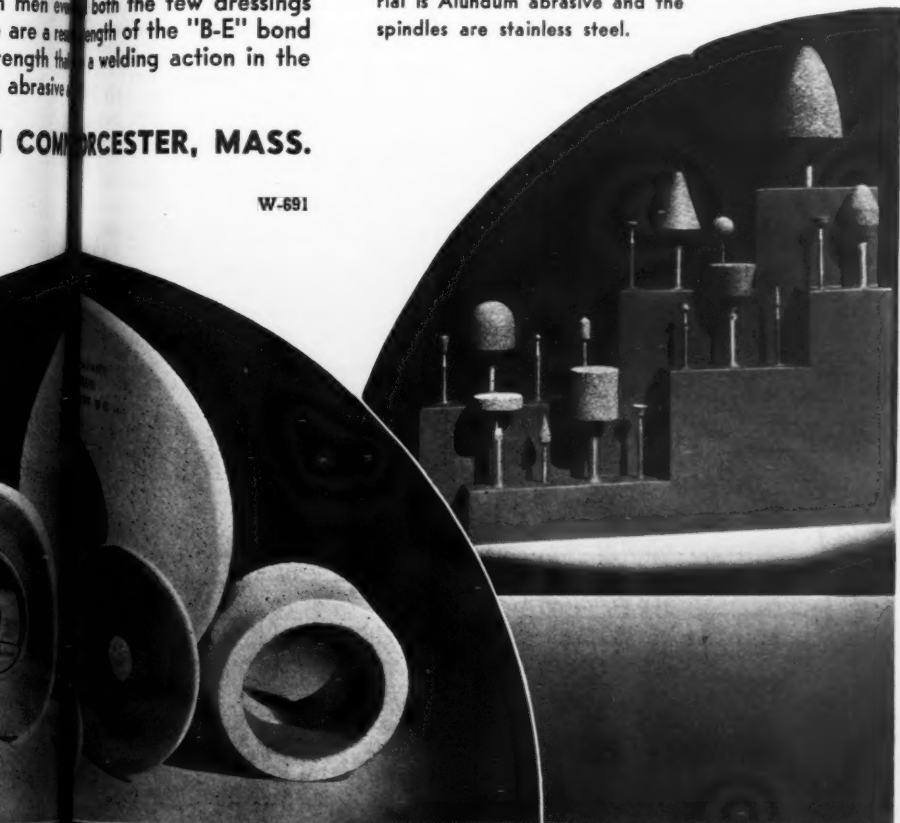
NAL abrasive shape and require few  
s—that's outstanding features of the  
orton "B-E" wheel. Combined with long  
cutting action this wheel the favorite  
men even both the few dressings  
are a result length of the "B-E" bond  
length than a welding action in the  
abrasive

COMBOLCESTER, MASS.

W-691

## NORTON MOUNTED POINTS

FOR all types of die grinding and other tool room  
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largest in a wide variety of shapes. The cutting mate-  
rial is Alundum abrasive and the  
spindles are stainless steel.



TORASIVES

# List of Exhibitors

## 1939 Machine and Tool Progress Exhibition

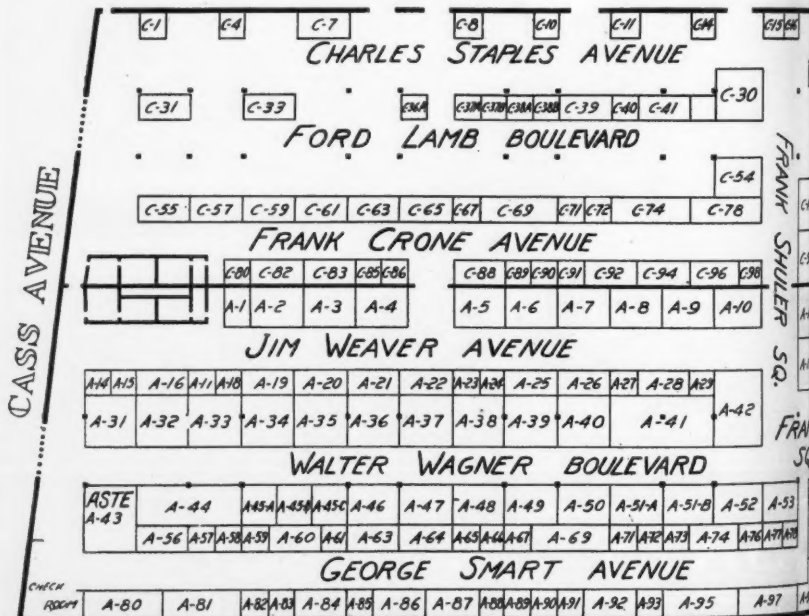
Company	Booth No.
ABRASIVE COMPANY Philadelphia, Pennsylvania	A-19
Abrasive Grinding Wheels and Abrasive Grain	
ABRASIVE DRESSING TOOLS CO. Detroit, Michigan	A-1
Diamond Dressing Tools	
ALLEN MFG. CO. Hartford, Connecticut	B-68
ALLIS-CHALMERS MFG. CO. Detroit, Michigan	A-69
AMERICAN BROACH SALES CO. Ann Arbor, Michigan	C-14

One rotary broach display table driven by  
¾ H.P. Motor

AMERICAN CHAIN & WRIGHT HOIST...  
Bridgeport, Connecticut  
Chain and Hoists

AMERICAN EQUIPMENT CO.  
Detroit, Michigan  
Air Equipment, chucks and collets; Hydraulics, Pumps

A. S. T. E. & BRAMSON PUBLISHING CO.  
Data on the publication of the Society, Bulletins of the Society. Information regarding memberships; qualifications for membership, etc.



AMERICAN MACHINIST" .....A-98  
New York, New York  
"American Machinist" and other technical  
publications

AMERICAN OPTICAL COMPANY.....B-100  
Southbridge, Massachusetts  
Fostering Eye Protection men will wear.

AMERICAN SAW & MFG. CO.....B-10  
Detroit, Michigan  
Rasmussen Automatic; Power Hack Saw  
Machine

AMERICAN SWISS FILE & TOOL CO...B-100  
Elizabeth, New Jersey  
Showing the many shapes, sizes and styles  
available to the Tool and Die industry

THE APEX MACHINE & TOOL CO.....A-58  
Dayton, Ohio  
Apex Universal Joint Wrenches, Phillips  
Screw Driving Bits; Floating Holders and  
Tap and Drill Chucks

ARMSTRONG BLUM MFG. CO.....C-69  
Chicago, Illinois  
Hack Saw Blades and Frames

ARMSTRONG BROTHERS TOOL CO.....C-68  
Chicago, Illinois  
Forged Tools, Holders, Clamps, Dogs, Wrenches

ATLAS PRESS CO.....A-16  
Kalamazoo, Michigan  
Luthes, Shapers, Arbor Press

AUTOMOTIVE MAINTENANCE  
MACHINERY CO. ....B-24  
Chicago, Illinois

AMMCO Tension Indicators; AMMCO  
6-In. Precision Shaper

BARBER COLMAN CO.....A-39  
Detroit, Michigan and Rockford, Illinois  
Small Tools

W. O. BARNES CO., INC.....A-85  
Detroit, Michigan

Barnes' Hack Saw Blades and Metal Cut-  
ting Band Saws. Hand blades will be  
bench demonstrated. Power blades will be  
demonstrated on an automatic stock feed  
Marvel hack saw machine

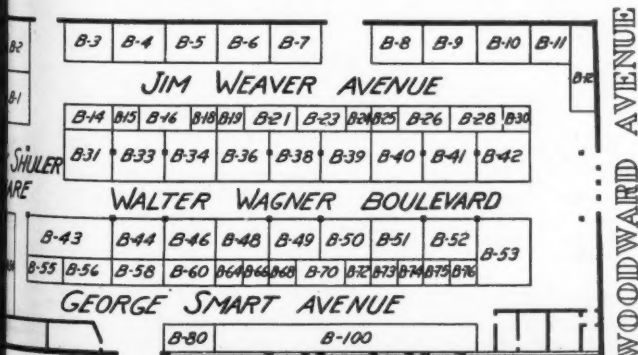
BARRETT-CRAVENS CO. ....B-55  
Chicago, Illinois  
Hand Lift-trucks, Portable Elevators, Lift-  
truck skids, Scale Truck

JOHN BATH CO. ....A-3  
Worcester, Massachusetts  
High speed steel ground thread taps; thread  
gages, internal micrometers, roll threading  
dies

BAUSCH & LAMB OPTICAL CO.....B-74  
Rochester, New York  
Large contour measuring projector, small  
contour measuring projector; toolmakers'  
microscope, wide field binocular micro-  
scopes, small optical tools for industrial  
purposes

BLACK & DECKER MFG. CO.....C-41  
Towson, Maryland  
Portable Electric Tools, both universal and  
High Cycle, including drills, sanders, grind-  
ers, shears, screw drivers, nut runners and  
their accessories

## Floor Plan of the A. S. T. E. Show



- BLANK & BUXTON MACHINERY CO.**....C-16  
*Jackson, Michigan*  
 One No. 38 Index High speed vertical mills, two No. 39 machines
- BOYAR-SCHULTZ CORP.** .....C-82  
*Chicago, Illinois*  
 Boyar-Schultz copperhead laps; Profile grinder No. 1; Profile Grinder No. 3
- THE BOYER-CAMPBELL CO.** .....B-100  
*Detroit, Michigan*  
 Safety equipment; flexible shafts and equipment; wire wheels, brushes, etc.; electric hoists and Hero-Alloy sling chains, Sabeco Bronze bushings and bearings; hack and band saws; precision files; belting and special drives, lathe and drill chucks; Dumore Precision Grinders and Drills
- BRIDGEPORT MACHINES, INC.**.....A-77  
*Bridgeport, Connecticut*  
 Bridgeport high speed milling attachments and turret milling machine
- BRISTOL COMPANY** .....A-18  
*Waterbury, Connecticut*  
 Fluted safety set screws; cap screws and screw products; steel belt lacing; possibly pyrometer
- BROWN & SHARPE CO.**.....A-6  
*Providence, Rhode Island*  
 Tools—Cutters
- CHARLES BRUNING CO.** .....A-38  
*Detroit, Michigan*  
 One No. 4 printer, one No. 149 Black & White Machine, one Drafting Table, one case displaying drawing instruments
- ANDREW C. CAMPBELL DIV.,  
 AMERICAN CHAIN & CABLE CO.**....B-8  
*Bridgeport, Connecticut*  
 Campbell Abrasive cutting machine and Campbell Nibbling machines
- CARBOLOY CO., INC.** .....B-43  
*Detroit, Michigan*  
 Representative carboloy tools plus a demonstration machining operation
- CARBORUNDUM COMPANY** .....A-2  
*Niagara Falls, New York*  
 Abrasive products
- CHARRON ENGINEERING SALES**.....B-9  
*Detroit, Michigan*  
 Representatives of Electro-Lift, Inc., and Hanna Engineering Works
- CHICAGO RIVET & MACHINE CO.**.....A-99  
*Chicago, Illinois*  
 Tubular Rivets, split rivets, automatic feed rivet setting machines.
- CHILTON COMPANY  
 (AUTOMOTIVE INDUSTRIES)** ...A-15  
*Philadelphia, Pennsylvania*  
 Automotive publications and literature only.
- CHISHOLM-MOORE HOIST CORP.**.....A  
*Tonawanda, New York*  
 Introducing under power the new "COMET" Hoist, and featuring Alloy Chains
- CHRYSLER CORPORATION** .....A  
*Detroit, Michigan*  
 Super-Finish
- CIRCULAR TOOL COMPANY, INC.**.....A  
 Metal Cutting Saws  $\frac{3}{4}$ -In. to 10-In. metal slitting discs and knives; Combined drills and countersinks; center reamers
- COGSDILL TWIST DRILL CO.**.....A  
*Detroit, Michigan*  
 Bearing-izing tools and Machine
- COLONIAL BROACH COMPANY**.....A  
*Detroit, Michigan*  
 Broaching Tools
- COLONIAL BUSHINGS, INC.**.....A  
*Detroit, Michigan*  
 Drill Jig Bushings and Screw Mach. Parts
- CONVENTION BINDER SERVICE** .....A  
*Chicago, Illinois*  
 Distributing catalog file binders of exhibitors literature
- ARTHUR A. CRAFTS CO., INC.**.....C  
*Boston, Massachusetts*  
 Diamond Tools; Tungsten carbide tools; diamond polishing equipment
- CUSHMAN CHUCK COMPANY**.....B  
*Hartford, Connecticut*  
 Lathe chucks and parts; power operated means for chucks
- THE DALRAE TOOLS CO.**.....A  
*Syracuse, New York*
- DAVIS BORING TOOL CO.**.....A  
*St. Louis, Missouri*  
 Boring tools, facing tools and reamers
- DAYTON ROGERS MFG. CO.**.....A  
*Minneapolis, Minnesota*  
 Representative stampings made in small lots under our particular process
- DAZOR MFG. CO.**.....A  
*St. Louis, Missouri*  
 Dazor Floating Lamp
- DELTA MANUFACTURING CO.**.....A  
*Milwaukee, Wisconsin*  
 11-In., 14-In. and 17-In. drill presses. Adaptations of drill press heads. Tool grinders. Metalcutting band saw
- A. P. DESANNO & SON**.....A  
*Philadelphia, Pennsylvania*  
 Radiac Type "K" Cutoff machine—two speeds for cutting wet and dry with abrasive discs. Radiac Type "F" Cutoff machine—Bench type for cutting dry only. Radiac Electric Industrial Grinder

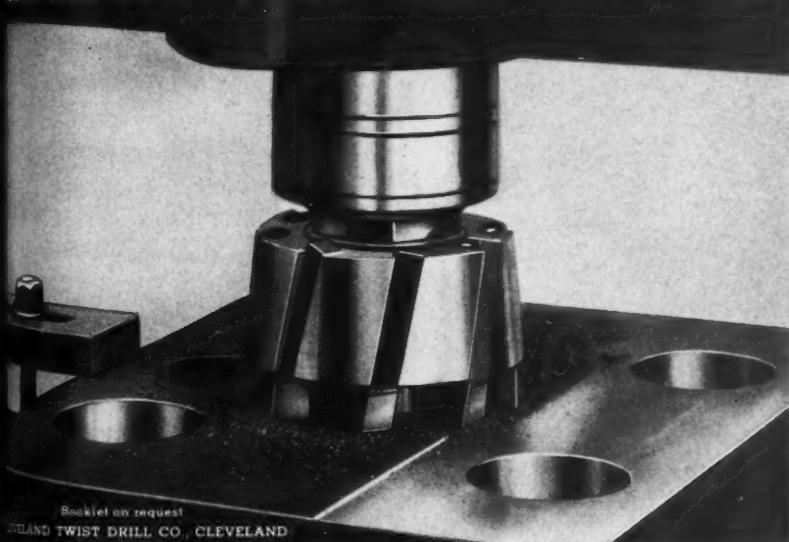


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Armstrong Steel Company  
Armstrong Steel Company of America  
Armstrong & Sons, Inc.

Halcomb Steel Division,  
Crucible Steel Company of America  
Jessop Steel Company  
Larrobe Electric Steel Company  
Simonds Saw and Steel Company  
Universal-Cyclops Steel Corporation  
Vulcan Crucible Steel Company

### CANADA

Atlas Steels Limited  
Henry Diston & Sons, Inc.

### GREAT BRITAIN

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- DETROIT BROACH COMPANY**.....B-60  
*Detroit, Michigan*  
Broaches and Broaching equipment
- DETROIT POWER SCREWDRIVER CO.**....C-89  
*Detroit, Michigan*  
Automatic Screwdriving Machines and Special Hoppers
- DETROIT TAP & TOOL CO.**.....A-42  
*Detroit, Michigan*  
Thread cutting tools and gages. "Crobalt" thread plug gages. Thread milling hobs
- EUGENE DIETZGEN CO.**.....B-7  
*Chicago, Illinois*  
Drafting, Surveying and Reproduction supplies
- THE DUMORE COMPANY**.....B-72  
*Racine, Wisconsin*  
Electric Tools, Motors and Grinders
- EAST SHORE MACHINE PRODUCTS CO.**..B-16  
*Cleveland, Ohio*  
Glenney Expansion Broaches, and Severson Geared Pumps
- ECLIPSE COUNTERBORE CO.**.....A-80  
*Detroit, Michigan*  
High production tools, Counterbores, Countersinks, Core drills, multi-diameter cutters, die-sinking cutters, Micro Lok precision boring bars, Jig Bars, and Micro Lok reamer bars
- ELECTRO-LIFT, INC.**.....B-9  
*New York, New York*  
500-pound Midget Hoist, 500-pound two speed hoist, and a cut away of a 1,000-pound hoist
- ESCO ENGINEERING & SALES**.....A-21  
*Detroit, Michigan*
- ETTCO TOOL CO.**.....A-92  
*Brooklyn, New York*  
Drill Chucks (keyless); Top chucks, Multiple and Single Spindle Tapping heads; Tapping machines, Multiple spindle drill heads
- THE EXACT WEIGHT SCALE CO.**.....C-38-B  
*Columbus, Ohio*  
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- EX-CELL-O CORPORATION**.....A-32  
*Detroit, Michigan*  
Grinding Spindles, Precision Parts, Cutting Tools, Broaches, Drill Jig Bushings
- J. N. FAUVER, INC.**.....C-34  
*Detroit, Michigan*  
Equipment for fluid materials. Lubricators, Filters, Hydraulic Fittings, Valves, Hose Couplings, Air Lubricators, Regulators and Pumps
- FEDERAL MOGUL CORPORATION**.....C-7  
*Detroit, Michigan*  
Bearings—Steel Back, Babbitt Lined, Babbitt Metal; Bearings—Steel Back, Cadmium - Silver - Copper Lined; Bearings—Bronze Back-Babbitt Lined, Bronze Bushings, Castings, Bars
- FEDERAL PRODUCTS CORPORATION**.....A-1  
*Providence, Rhode Island*  
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- THE FELLOWS GEAR SHAPER CO.**.....A-1  
*Springfield, Vermont*  
Gear and Cutter Measuring and Chocking Equipment; complete line of Tools and Gear Shaper Cutters; Samples of Work, Etc.
- FIRTH STERLING STEEL CO.**.....A-1  
*McKeesport, Pennsylvania*
- FORD MOTOR COMPANY**.....A-3  
*Dearborn, Michigan*  
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- FREDERICKSON COMPANY**.....B-10  
*Saginaw, Michigan*  
Demonstrating Sabco Bronze in many combinations, both in finished product as well as in course of manufacture
- THE GAIRING TOOL COMPANY**.....B-4  
*Detroit, Michigan*  
Standard and Special Cutting Tools
- GALLAND-HENNING MFG. CO.**.....C-7  
*Milwaukee, Wisconsin*  
Air Valves and Air Cylinders
- THE GAMMONS-HOLMAN CO.**.....B-10  
*Manchester, Connecticut*  
Gammons Reamers and End Mills
- JAMES W. GEORGE**.....A-4  
*Detroit, Michigan*  
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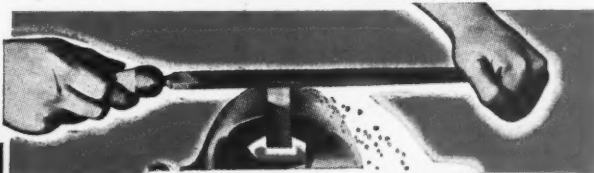
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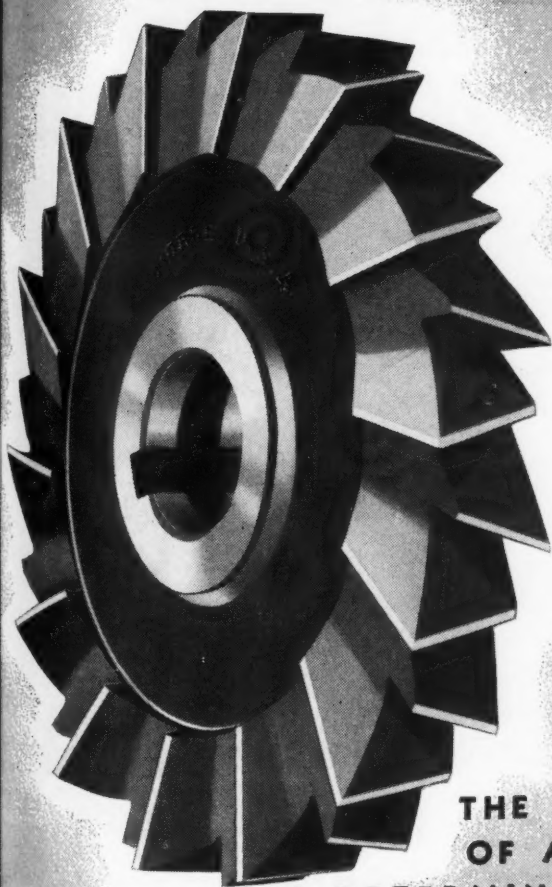
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MODERN MACHINE SHOP

127

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Co., Nielsen, Inc. & Seamlex Co.
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- GROB BROTHERS** .....B-54  
*Grafton, Wisconsin*  
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Automatic Polishing Machinery
- HANNA ENGINEERING WORKS.** .....B-9  
*Chicago, Illinois*  
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- HANNIFIN MANUFACTURING CO.** .....A-33  
*Chicago, Illinois*  
Presses and Riveting Equipment
- THE HANSON WHITNEY MACHINE CO.**..C-59  
*Hartford, Connecticut*  
Taps; Thread Gages; Cutters; Precision Screws, Etc.
- HARDINGE BROTHERS, INC.** .....C-86  
*Elmira, New York*  
Sjogren Speed Collet Chucks; Collet Index Fixtures; Lathe and Milling Machine Collets
- HAYNES STELLITE COMPANY** .....B-26  
*New York, New York*  
Haynes Stellite Metal Cutting Tools
- THE HEIM COMPANY**.....  
*Fairfield, Connecticut*  
Heim Die Polishing Machine
- HELLER BROTHERS COMPANY**.....  
*Newark, New Jersey*  
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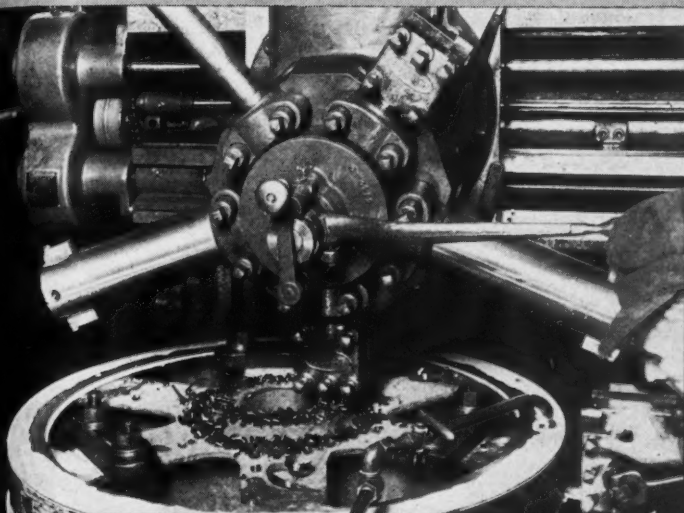
March, 1939

MODERN MACHINE SHOP 129

- Samples of nickel alloy steels, nickel cast irons, Ni-Resist, Ni-Hard, nickel brasses and bronzes and Alnico, etc.
- THE IRON AGE PUBLISHING CO.**.....A-7  
New York City  
Data on the publication, "Iron Age"
- THE JACOBS MFG. CO.**.....A-65  
Hartford, Connecticut  
Drill Chucks and an electric display
- CHARLES L. JARVIS CO.**.....A-48  
Middletown, Connecticut  
Flexible shaft machines, tools for sanding, grinding, rotary filing, polishing, etc. Tapping attachments. Quick change chucks and Collets. Screw driver clutches and Flexible shaft screw driving machines
- JOHNSON BRONZE CO.**.....C-8  
New Castle, Pennsylvania  
Bearings, Bushings, Bar Bronze Babbitt
- JONES-FORS CO.**.....A-57  
Detroit, Michigan  
Phillips Screw Driver Bits, Disston Files, Grinders, Industrial tool and equipment
- JONES & LAMSON MACHINE CO.**.....A-50  
Springfield, Vermont
- KOEBEL DIAMOND TOOL CO.**.....A-53  
Detroit, Michigan  
Diamond Tools
- LEE MACHINERY CO., INC.**.....A-28  
Detroit, Michigan  
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- K. O. LEE & SON CO.**.....B-16  
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- LELAND GIFFORD CO.**.....B-70  
Detroit, Michigan
- LEMAIRE TOOL & MFG. CO.**.....A-25  
Dearborn, Michigan  
Hydraulic Panels and Valves, also Units, Special Machinery and Tools
- LENNEY MACHINE & MFG. CO.**.....B-16  
Warren, Ohio  
Lenney Infinite Variable Speed Drive
- LINK ENGINEERING & MFG. CO.**.....A-17  
Detroit, Michigan  
Link Spring Checking Equipment
- LOGANSPORT MACHINE, INC.**.....A-4  
Logansport, Indiana  
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- THE LUFKIN RULE CO.**.....A-74  
Saginaw, Michigan  
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- THE MCCASKEY REGISTER CO.**.....A  
Alliance, Ohio  
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- MCCROSKY TOOL CORP.**.....A-4  
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- MANUFACTURERS BRUSH CO.**.....B  
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- MICROMATIC HONE CORP.**.....C  
Detroit, Michigan
- MIDWEST PRODUCTION ENGINEERING CO.**.....A  
Detroit, Michigan  
Hydraulic Piercing Equipment—Machines and Units to be Operating
- MIDWEST TOOL & MFG. CO.**.....A-48  
Detroit, Michigan
- "MILL & FACTORY"**.....C  
New York City  
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Minster, Ohio  
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*Cincinnati, Ohio*  
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DIVISION .....C-85  
*Elmira, New York*  
Automatic and Hand Screw Machine Collets, Feed Fingers
- MOTOR TOOL MANUFACTURING CO....C-11  
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- MUELLER BRASS CO. ....C-18  
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- NATIONAL TOOL SALVAGE CO.....A-82  
*Detroit, Michigan*  
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- NEW BRITAIN-GRIDLEY MACHINE DIVISION, THE NEW BRITAIN MACHINE CO. ....A-76  
*New Britain, Connecticut*  
Collets
- NIELSEN, INC. ....B-16  
*Lawton, Michigan*  
Nielsen Live Centers
- NICHOLSON FILE COMPANY.....A-66  
*Providence, Rhode Island*  
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- NORTON COMPANY .....A-47  
*Worcester, Massachusetts*
- THE O. K. TOOL CO.....B-48  
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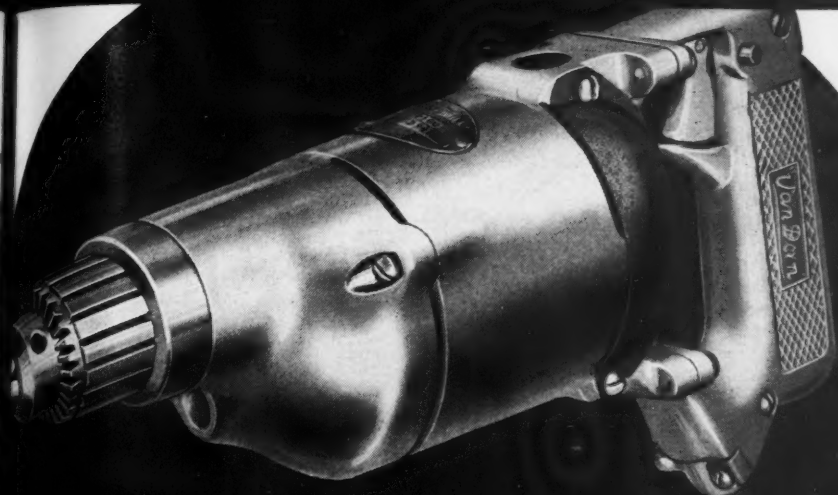
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*Cleveland, Ohio*  
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- SCULLY-JONES & CO.**.....C-63  
*Chicago, Illinois*
- SEAMLEX COMPANY**.....B-16  
*Long Island City, New York*  
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- SNYDER TOOL & ENGINEERING CO.**.....A  
*Detroit, Michigan*
- SOCONY VACUUM OIL CO.**.....D  
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*South Bend, Indiana*  
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- N. A. STRAND & CO.**.....B-10  
*Chicago, Illinois*  
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- CHAS. A. STRELINGER CO.**.....C  
*Detroit, Michigan*  
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- STRONG-CARLISLE & HAMMOND CO.**.....A  
*Detroit, Michigan*  
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- SUPER TOOL CO.**.....A  
*Detroit, Michigan*



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THE "RED HEADED"

# "Van Dorn"

PORTABLE ELECTRIC TOOLS

- Tungsten Carbide Metal and Tipped Tools; Diamond Tools
- SUTTON TOOL COMPANY**.....A-45-C  
Detroit, Michigan
- SWARTZ TOOL PRODUCTS CO., INC.**.....A-14  
Detroit, Michigan  
Standard line of jigs and fixtures and Swartz locks
- SWEDISH GAGE CO. OF AMERICA**.....A-24  
Detroit, Michigan  
Micrometers, Internal Indicators, snap gages, amplifying gages, and drill chucks
- THE TAFT-PEIRCE MFG. CO.**.....C-100  
Woonsocket, Rhode Island  
Gages, superpower magnetic chucks, adjustable reamers, production and inspection tools, contract work, and precision surface grinder
- TANNEWITZ WORKS** .....B-10  
Detroit, Michigan  
Die Sawing Machine, Tannewitz Abrasive cut off and Mitre machine, Tannewitz high speed band saw machine
- T C M MANUFACTURING COMPANY**..C-36-B  
(Harrison Machine Works)  
Harrison, New Jersey  
Grinding and Lapping Machine, Diamond Set Wheels, Brazing Fixtures
- THE TEXAS COMPANY**.....C-37-A  
Chicago, Illinois
- THOMAS MACHINE MFG. CO.**.....A-20  
Pittsburgh, Pennsylvania  
Two inclinable power presses
- THE TOMKINS JOHNSON CO.**.....B-33  
Jackson, Michigan  
Rivitor Machine, Clinchor Machine, T-J Non-Rotating Air Cylinders, Brownie Coolant Pumps, T-J Die Sinking Milling Cutters
- TOW MOTOR COMPANY**.....C-92  
Detroit, Michigan  
Gasoline Powered Ford Trucks and Tractors
- TUNGSTEN CARBIDE TOOL CO.**.....A-42  
Detroit, Michigan  
Tungsten Carbide Tipped Tools
- THE UNITED STATES ELECTRICAL TOOL CO.** .....A-71  
Cincinnati, Ohio  
Electric Tools—Drills, Grinders, Polishers
- UNIVERSAL HIGH-SPEED TOOL CO.**.....B-23  
Cleveland, Ohio  
Eklind Universal Milling Head; Eklind Universal Milling, Drilling and Boring Heads; "HYDRA-SPEED" Duplicating Units
- VANADIUM-ALLOYS STEEL CO.** .....B  
Latrobe, Pennsylvania
- THE VAN DORN ELECTRIC TOOL CO.**.....C  
Towson, Maryland  
Portable Electric Tools
- VICKERS, INC.** .....A  
Detroit, Michigan  
Pumps, Hydraulic control equipment; including working display of a typical rapid traverse and feed hydraulic circuit
- VICTOR SAW WORKS, INC.**.....B  
Middletown, New York  
Victor Moly Blades and C 17 Precision Lawn Mower, "the mower of New France"
- VINCO TOOL COMPANY**.....C  
Detroit, Michigan  
Tools and Gages
- R. A. VINE MACHINERY**.....A  
Detroit, Michigan  
Dayton Rogers Pneumatic Die Castings for deep draw work
- WALKER TURNER CO., INC.**.....C  
Plainfield, New Jersey  
Drill Presses, Flexible Shafts, Metal Cutting Band Saw
- WELDING EQUIPMENT SUPPLY CO.**.....C  
Detroit, Michigan
- WELDON TOOL COMPANY**.....B  
Cleveland, Ohio
- WESSON COMPANY** .....B  
Detroit, Michigan  
Cutting Tools
- WESTINGHOUSE ELECTRIC & MFG. CO.**.....A  
East Pittsburgh, Pennsylvania  
Operating Motors and Control
- WESTLOF TOOL & DIE CO.**.....C  
Detroit, Michigan  
Schultes Safety Drive
- WETMORE REAMER COMPANY**.....A  
Milwaukee, Wisconsin
- WHITNEY METAL TOOL COMPANY**.....A  
Rockford, Illinois  
Metal Working Tools, Bending Brake, Rolling Machine
- WILEY'S CARBIDE TOOL CO.**.....C  
Detroit, Michigan  
Tungsten Carbide Tools, Drills, Reamers, Cutters
- J. H. WILLIAMS CO.**.....A  
New York City  
Lathe Tools—Wrenches
- WILSON MECHANICAL INSTRUMENT CO.** .....B  
New York City  
"Rockwell" Hardness Tester, "Rockwell" Superficial Hardness Tester



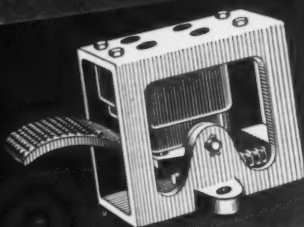
# ROSS *Air Control* VALVES

are  
**STURDILY  
BUILT**



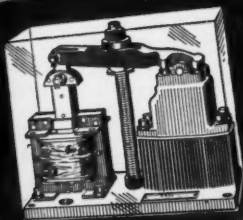
## HAND CONTROL

All working parts made of hardened steel to give maximum service. Poppets of non-corrosive metals with oil resistant rubber seats, offer long life.



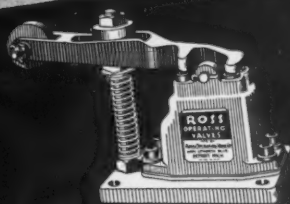
## FOOT CONTROL

Bracket or frame is a heavy casting which will stand up under the roughest sort of handling. Foot treadle is overweight for extra strength.



## SOLENOID CONTROL

Oversize solenoid for reliable service. Extra heavy base for mounting purposes. Heavy pressed metal protecting cover. Overweight lever and links to meet severest demands.



## MECHANICAL CONTROL

Spring and spring rod are oversize for extra strength. Hardened roller for maximum wear. Heavy base to meet extreme demands.



**REGARDLESS** of type or size, or the use to which they are put, Ross valves are all fundamentally alike, all sturdily built. Heavy bronze cast body with walls much thicker than usually considered necessary, each individual part designed with an extra strength factor which provides many years of dependable service—under severest conditions. For that unfailing service install Ross valves on your air-actuated equipment.

Send for Catalog No. 37

**ROSS OPERATING VALVE COMPANY**  
6484 Epworth Boulevard • Detroit, Michigan

THE BRIDLE FOR  
AIR HORSEPOWER

THE YALE & TOWNE MFG. CO.....C-31  
Philadelphia, Pennsylvania

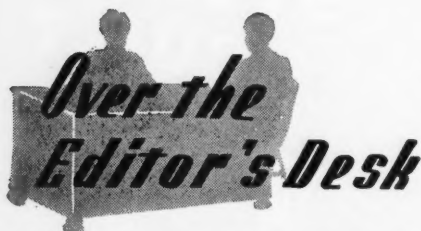
Electric Wire Rope Hoist—Electric Industrial Trucks, Hand Lift Trucks, Skid Platforms

J. ZAGORA MACHINE & GEAR CO.....C-4  
Charlotte, North Carolina

Stationary light support

CARL ZEISS, INC. ....  
New York City  
Mechanical and Optical Instruments

WM. M. ZIEGLER TOOL CO.....  
Detroit, Michigan  
Ziegler Floating Tool Holders.



**T**HE list of Tool Show exhibitors has overflowed onto the editor's own page this month, but we still have room enough to offer here our congratulations to the American Society of Tool Engineers upon the success and astounding growth of this organization since its inception in 1932.

There was a time, in the early days of the automobile industry, when each automobile manufacturer was making a desperate effort to develop new applications of the principle of internal combustion and new mechanical devices which might give him an advantage over his competitors. Everyone realized that there were great opportunities ahead and every automobile plant had its experimental department, which was kept under lock and key lest a spy from another manufacturer's organization should find out what was being done.

With each one trying so hard to obtain the advantage over his rivals and with such attempts at secrecy, the progress of the industry was comparatively slow. However, as the industry grew and the engineers found that they were all working independently toward the same goal, they

decided to pool their interests and make the knowledge of each available to all. Thus was formed the organization which later became the Society of Automotive Engineers and from that time on the industry made great strides.

The problems confronting the engineers who design the tools for the industry are fully as great as the problems of the automotive engineers, but through all of the years up to 1932 there was no common meeting ground upon which the tool engineers could get together for frank interchange of views and experiences. The marvelous growth of this society in the seven years of its existence is a testimony to the need for such an organization and to the excellence of the manner in which that need has been filled by the A. S. T. E.

With the growth and spread of modern methods of manufacturing, tool engineers are now to be found in practically every metal manufacturing plant of any size. However, it has been pretty generally recognized that the automobile industry was the father of modern production methods as we know them today and it was to be expected that such an organization as the A. S. T. E. should originate in Detroit—the capital of the world in production engineering.

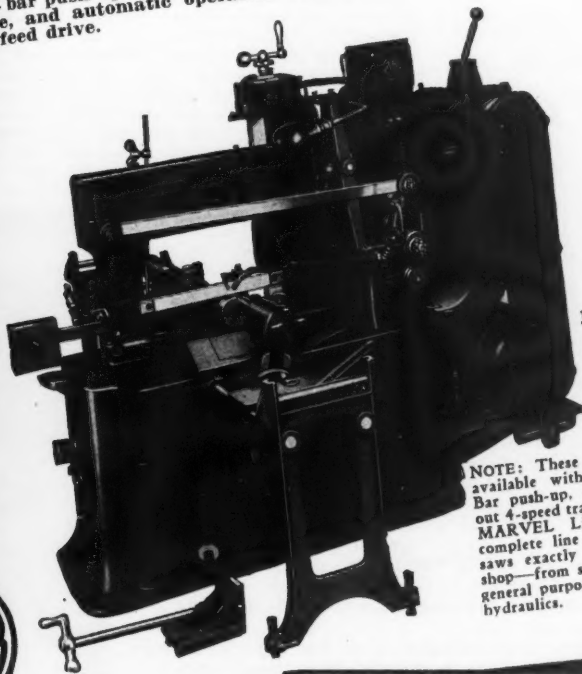
May we take this opportunity to impress upon our readers the educational value of both the exhibitions and the technical sessions, and urge that everyone who can attend should do so.

# MARVEL SAWS AND BLADES

## You are paying too much for CUTTING-OFF

Unless you have one or more new heavy-duty, super high speed MARVEL Automatic Hack Saws, you are paying too much for cutting-off. No other machine of comparable accuracy will cut off an equal number of pieces from bar stock in diameters to 10" with such speed, at such low labor cost, power cost, tool cost or with such small chip loss. Far heavier, and all ball-bearing, these MARVEL Automatic Saws No. 6A and 9A are built for continuous operation at speeds, feeds and blade tensions impractical for other equipment. They will cut off identical lengths, 10 pieces of 6" round, 100 pieces of 1½" round every hour floor-to-floor, and other sizes proportionally. They cut off squarely and accurately—save stock and machining.

While strictly production tools that require no more attention than an automatic screw machine, MARVEL Automatics are also multipurpose; will handle all run of the shop sawing easily and efficiently—bar push-up can be disengaged at any point, miscellaneous cuts made, and automatic operation resumed by re-engagement of the bar feed drive.



**MARVEL  
6A  
(Capacity  
6"x6")**

**MARVEL  
9A  
(Capacity  
10"x10")**

NOTE: These machines are available without automatic Bar push-up, with or without 4-speed transmission. The MARVEL Line, the most complete line built, provides saws exactly suited to each shop—from small low priced general purpose saws to giant hydraulics.

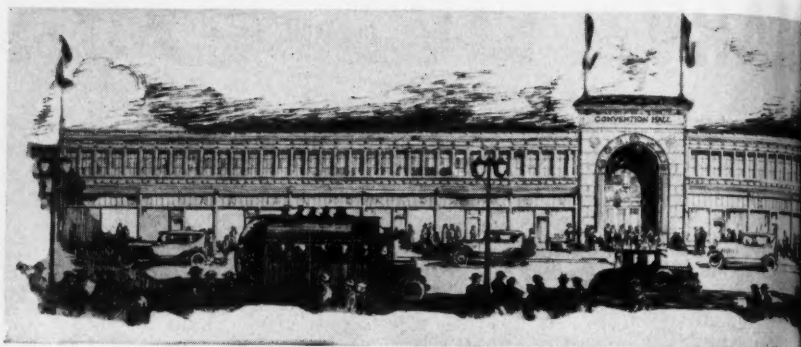
**ARMSTRONG-BLUM MFG. CO.**

"The Hack Saw People"

5745 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales: 199 Lafayette St., N. Y.





## New Equipment to a



Boyar-Schultz Profile Grinder

5 in. diameter. The wheel head and compound table can be swiveled 360 deg. The grinder can also be used for sharpening milling cutters and grinding end mills.

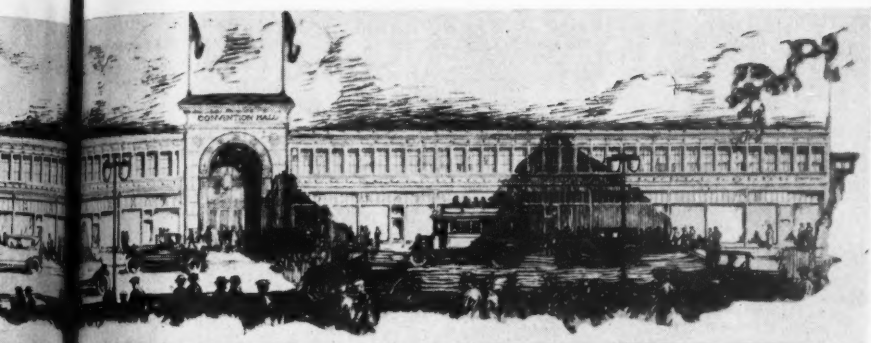
A second new Lee product is a line of chucks for handling heavy duty precision high speed drilling requirements. Work load automatically tightens the grip in proportion to resistance encountered. Five sizes are available, ranging up to 1/2-in drill size.

Boyar-Schultz Co., Chicago, Ill. This company is showing for the first time its new floor model Profile Grinder designed for tool and die work of the large and complicated types. Wheels operate at 18,000 r.p.m., driven through a 2 h.p. ball bearing motor. The machine is somewhat similar in construction to the portable Profile Grinder produced by the company in the past. All controls are conveniently located on the front of the machine. In addition, the company is exhibiting a line of special toolroom and machine shop bolts to chrome - molybdenum, copper head laps, and copper head expansion laps. Booth No. C-82.

K. O. Lee & Son Co., Aberdeen, S. D., is showing a number of new products including a universal tool and cutter grinder of the bench type. The grinder carries a 6-in. wheel and may be used for grinding cutters up to



K. O. Lee Welder



## t to n at the Tool Show

This company also is showing a new line of expanding mandrels of tool steel, hardened and precision ground. The mandrels are featured by the use of a replaceable "live" center. Sizes range from  $\frac{1}{8}$  to  $5\frac{1}{2}$  inches.

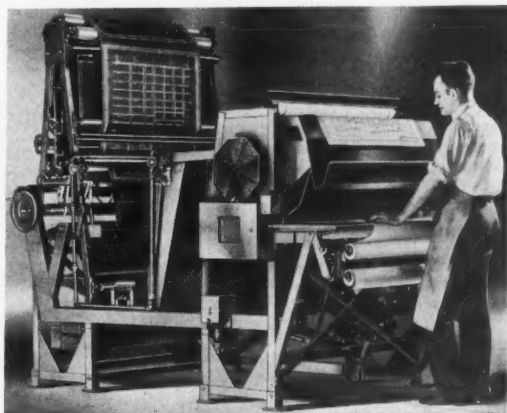
An additional exhibit is an A. C. Arc Welder, available in three sizes. The welder is self-contained with the transformer bolted to the framework. There are 10 heat taps controlled by plugging in. The entire unit is mounted on rubber casters. Booth No. B-11.

The C. F. Pease Co., Chicago, Ill., is exhibiting two models of blueprinting machines, the model 9 completely contained in a streamlined cabinet and the No. 11, designed for high production of blueprints with the lowest investment cost. Booth No. A-46.

Barrett - Cravens Co., Chicago, Ill., is announcing a new pallet-handling truck for handling double-faced pallets. In addition, this firm is showing, for the first time, the new line of Barrett Floor Trucks. Booth No. B-55.

Michigan Tool Company, Detroit, Mich., will exhibit its latest type of rack-type shaving machine, designed

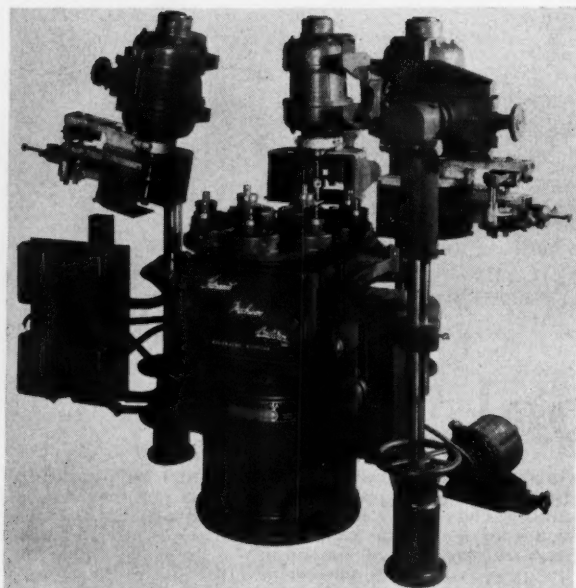
for heavy duty work and incorporating a new hydraulic oscillating mechanism for the work-carrying head. An automatic cone worm gear generator, capable of machining cone gears from the blank in one minute will be in operation at the show. Also on exhibit will



Pease Blueprinting Machine

be a new type of involute checker, as well as Mitco gear cutting tools such as hobs and shaper cutters. Booth No. A-42.

Rotor Tool Company, Cleveland, Ohio, is announcing a complete new line of High Cycle Electric Drills, Screw Driv-



Hammond Automatic Polishing and Buffing Machine

ers, and Nut Setters, ranging in capacity from  $\frac{1}{8}$  to  $\frac{3}{4}$  in., to be shown for the first time. These new products are equipped with triple action rotor clutches designed to provide uniform tension and increase capacity of the power units. The clutches operate on the impact principle to increase the work torque over that supplied by the motor, providing high power with light weight.

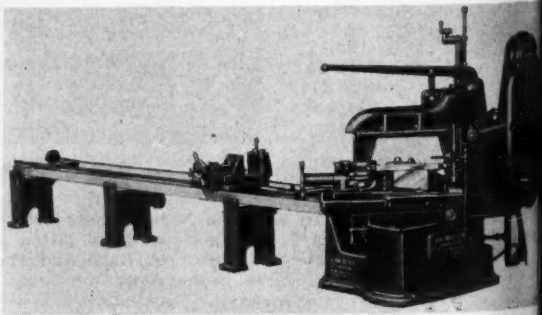
In addition to this new line, the company will exhibit high cycle grinders, buffers, polishers, sanders, etc., and a similar line of tools, air operated. Booth No. E-50.

**Hammond Machinery Builders, Inc.,** Kalamazoo, Mich. An interesting new automatic polishing and buffing machine will be exhibited by this company. The

machine is fitted with the new Hammond rotodopers, which automatically apply composition to the wheels. The machine has a rotary table with eight revolving spindles, connected by chain sprocket drives to a ball bearing worm reducing motor. The spindles stop revolving when they reach the loading and unloading position. The manufacturers state that 1,800 pieces per hour is possible with this machine, depending upon the nature of the work. Booth No. C-91.

**Rasmussen Machinery Co.,** Racine, Wis., through Bertsch Machinery Co., will display a new Rasmussen Automatic Metal-Cutting Power Hack Saw.

The company also manufactures and shows the Lenox line of band saw blades, power hack saw blades, as well as hand blades. The machine shown is of the automatic feed type suitable for multiple cutting operations either straight or at any angle up to 45 deg. The swinging construction of the machine makes it possible to install the equipment against a wall or along an aisle.



Rasmussen Automatic Metal-Cutting Power Hack Saw



# HERE'S JUST THE BAR YOU NEED!



nearby Union Drawn Distributor has it in stock—ready for  
 delivery—when and where you need it. He can supply  
 with a single bar or a dozen bars.

His racks are well stocked with all popular shapes and sizes—  
 any bar of the same dependable, uniform quality typical of Union  
 Cold Finished Steels. He carries shafting, too, in needed sizes.

Make your Union Drawn Distributor's stocks your stocks—his  
 warehouse your warehouse. Let him worry about handling costs,  
 storage costs, depreciation, insurance and what sizes and shapes  
 you may need tomorrow or the next day. He'll do it—gladly, effi-  
 ciently and to your profit. He can give you sound advice, too, on  
 proper steel to use and how best to process it.

## UNION COLD FINISHED STEELS

MODERN MACHINE SHOP 143

fitted with  
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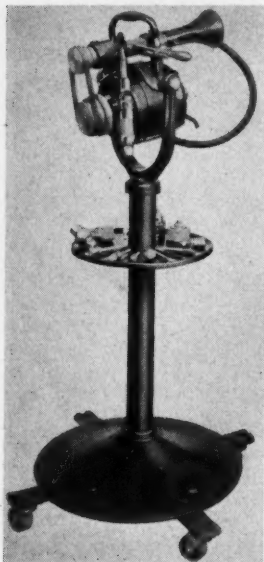
k Saw

March, 1939

desirable when cutting from long bars. Feed can be regulated in  $\frac{1}{8}$ -in. steps from 0 to 24 in. Booth No. B-10.

**Firth Sterling Steel Co., McKeesport, Pa.,** is exhibiting a Braze-Rite Furnace, electrically operated with a hydrogen atmosphere specially designed for the tipping of sintered carbide cutting and wear resisting tools and parts. The furnace is designed to localize the heat at the

end of the tool, eliminating the necessity of heating the entire shank and reducing time required for brazing. A feature of the furnace is that gradual current reductions when shutting down are not necessary. Booth No. A-95.

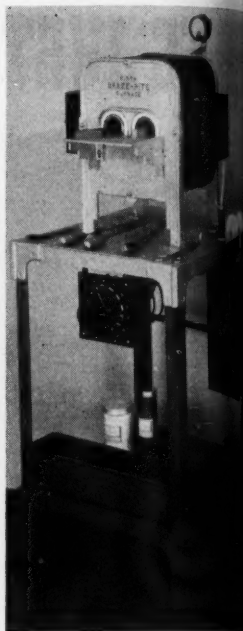


**Martindale Flexible Shaft Unit**

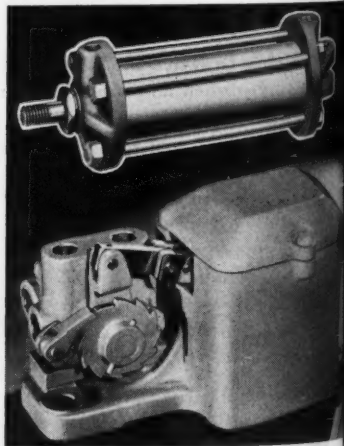
permitting instant adjustment of belt tension and quick change of pulley speeds. Booth No. B-15.

**Galland-Henning Co., Milwaukee, Wis.,** is building its display around the new Nopak non-adjustable cushioned air cylinders and solenoid-operated air-controlled valves. The new air cylinders feature a cushion stop at each end of the piston stroke, eliminating metal-to-metal impact. The new line is, of course, a simplified edition of the Nopak adjustable cushion air cylinders previously marketed by this company. Booth No. C-72.

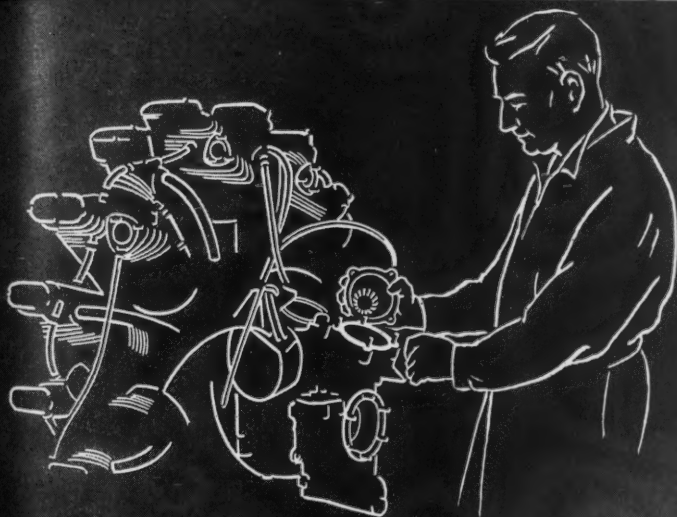
**The Martindale Electric Co., Cleveland, Ohio.** This company's exhibit will feature a new flexible shaft unit designated as the Multi-Speed Floor-Type Motor-Flex unit. This unit is to be available in three general types, ranging from  $\frac{1}{4}$  to  $\frac{1}{2}$  h.p. with shafts in proportion. A construction feature is the hinging of Jack-Shaft



**Braze-Rite Furnace**



**Galland-Henning Air Cylinder and Valve**



Take aircraft...  
where *accuracy* is vital



● No half measures! Adjustments in aircraft assembly—flap control, stabilizer, tail chassis, adjustable-pitch propeller, engine, instruments—all must be held to extreme accuracy. ● “Without Laminum shims it would be practically impossible to adjust certain assemblies to the close limit required”—this from a top-ranking airplane builder. ● Laminum shims are doing the *same* job throughout industry... and at the same time speeding precision assembly and bringing down costs. Paper-thin laminations (your choice of .003 or .002 inch, or less, in thickness) are simply peeled off the brass shim as needed. As easy as that—in assembly or service adjustments!

*Laminum shims are furnished cut to your exact specifications. For maintenance requirements, Laminum sheets or strips are obtainable from leading mill supply houses.*

**LAMINATED SHIM CO., INC.** 21-30 44th Avenue, L. I. City, New York, N. Y.

CLEVELAND

DALLAS

HOUSTON

MILWAUKEE

TULSA

1147

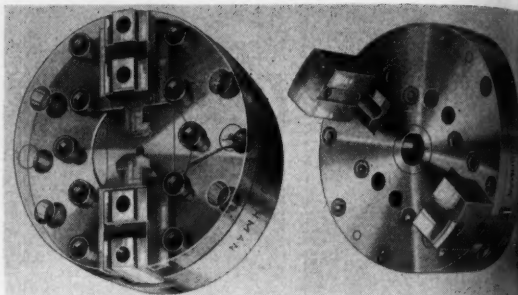
**LAMINUM**

THE SOLID SHIM  
THAT *peels* FOR ADJUSTMENT



**Application Chart FREE**  
Write us for new file-folder illustrating the many types of bearings in which LAMINUM shims find application. For handy practical use. With it a sample of Laminum.

**Cushman Chuck Co.,** Hartford, Conn., is exhibiting two new precision two and three-jaw chucks. The first of these is recommended for use on modern turret lathes and heavy duty automatics. The new chucks are heavy duty power-operated tools of the smaller, 6 to 12-in. size. Booth No. B-52.

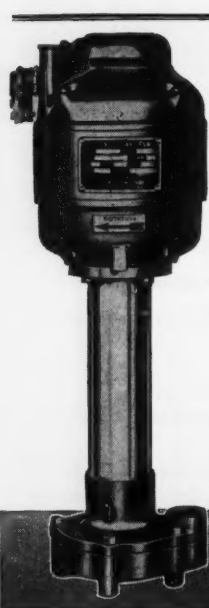


Cushman Precision Two-Jaw and Three-Jaw Chucks

**American Swiss File & Tool Co.,** Elizabeth, N. J., is exhibiting some of its 5,400 different styles and shapes of Swiss Pattern Files. These files are in some cases manufactured to a tolerance as close as 0.002 in. Booth No. B-100.

**The Helm Company,** Fairfield, Conn., is showing a die polishing machine employing endless abrasive belts. The arrangement of the belts is such as to

polish the die substantially parallel with the line of draw of the work through the die. The operation is intended, of course, to provide much finer finish, increasing the efficiency and life of dies, while reducing upkeep. The machine is designed for use with virtually all types of dies including those for rods, bars, tubing and dies for blanking and deep drawing. Two sizes of the machine are available. Booth No. B-16.



## A COMPLETE LINE

● "GUSHER" Coolant Pumps are in use today on every type of machine tool . . . pumping every kind of liquid . . . cooling every variety of metal cutting job.

90 leading machine tool builders have tested, approved and specified "GUSHER" Pumps because Ruthman meets their demands for dependable coolant flow, easy regulation and low power requirements.

*Write for complete catalog.*

**THE RUTHMAN MACHINERY CO.**  
 138 E. EDDY STREET • CINCINNATI, O.

# Shop Tools

MODEL BJA

MODEL KT-713

MODEL KT-715

MACHINISTS' CLAMPS

ALLOY ENGINEERS'

CARBON STEEL  
ENGINEERS'

DROP FORGED HAMMERS



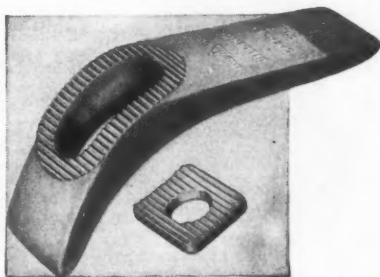
## BILLINGS

*always have been good!*

Every one Guaranteed—Safe to use—made for a Long and Efficient Life. New Tools and Wrenches, by Billings, are always accepted by users—they know "Billings always have been good." Generations of Forging Craftsmanship plus modern metallurgical knowledge are built into Billings Shop Tools and Wrenches. It's profitable to Use Them!

### Adjustable STRAP CLAMP

Holds work of irregular shapes—sizes without blocks and shims to Planers, Milling Machines, etc. Shown Pg. 79 New Catalog.



Order Through Your  
Industrial Distributor.

COMMERCIAL DROP FORGING  
BORED DROP HAMMERS - DIE MAKING MACHINERY

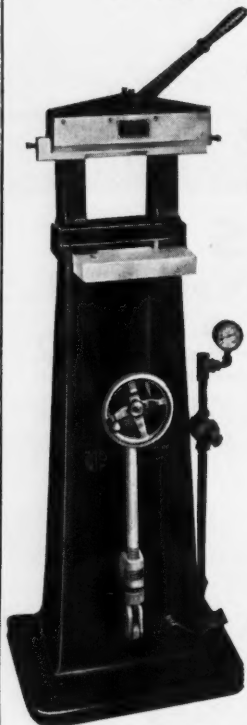
# Billings

## FORGED TOOLS

THE BILLINGS & SPENCER COMPANY, HARTFORD, CONN., U. S. A.

MODERN MACHINE SHOP 147

**YOUR PRODUCTS  
ALWAYS  
IDENTIFIED  
IF PERMANENTLY  
MARKED  
IN THIS MACHINE**



MARKING  
BY ROLLING  
IS FAST AND  
ECONOMICAL.  
PRESERVES  
DIE LIFE AND  
PIECE PARTS.  
REQUIRES  
ONLY FRACTION  
OF  
APPLIED  
PRESSURE  
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PARED TO  
STAMPING.

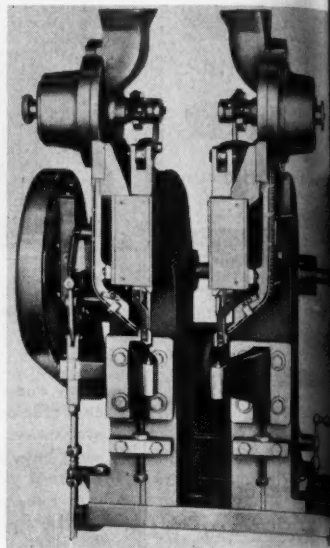
**QUICK  
SET-UPS**

**MODEL 25  
HI-DUTY  
MARKING  
MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

**GEO. T. SCHMIDT, Inc.**  
**1806 BELLE PLAINE AVE.**  
**CHICAGO, ILL.**

Chicago Rivet & Machine Co., Chicago, Ill. This company's exhibit stress automatic feed insertion clinching of rivets at high speed in single and multiple types. Latest developments in automatic rivet setting machines will be shown, including the



Chicago Rivet-Setting Machine

of adjustable centers for accurate quick setting of several rivets at time. Booth No. A-99.

The Positive Safety Manufacturing Co., Cleveland, Ohio, is exhibiting samples of its safety devices for operators of presses, etc. These safety devices are so designed as to pull operator's hands away from the work as the press ram travels down. Booth No. B-100.

Atlas Press Co., Kalamazoo, Mich. low cost precision lathe with power cross feed as standard equipment.



## IMPACT RESISTING



WHERE service conditions are most severe—where loads are heaviest—where impact, momentary overloads, and vibration are a problem—there NORMA-HOFFMANN PRECISION ROLLER BEARINGS demonstrate their extraordinary ability to absorb punishment.

Short parallel roller design—the use of a heavy-duty, completely machined bronze outer ring—extreme refinement of workmanship and finish—these factors combine to give these PRECISION Roller Bearings a lower coefficient of friction under heavy loads than any other type of ball or roller bearing, together with a speed-ability equal to that of any ball bearing, size for size. Write for the Catalog. Let our engineers work with you.

# **"NORMA-HOFFMANN"**

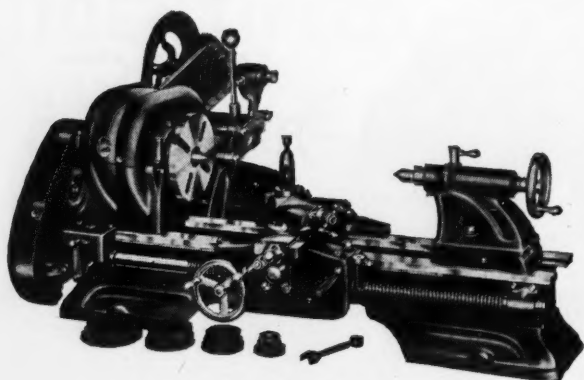
PRECISION BALL, ROLLER and THRUST BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U. S. A.

MODERN MACHINE SHOP 149

ing introduced by this company. While designed for mounting on a bench, the lathe is of precision construction

In addition, there will be on exhibit a shaper for use on work requiring a stroke of 7 in. or less and two presses of 15 and 20 in. stroke, air presses, motors, grinders, drill grinder attachment, etc. The company is also producing a new line 6-in. bench lathe Booth No. A-16.



Atlas Bench Lathe

throughout. Features include reversible motor, precision ground ways, quick change countershafts, 16-speed "V" belt drive, wide thread cutting range, 60-hole indexing mechanism, etc.

finger with a positive feed-out, and new no-scratch feed finger with roller bushings for ground and polished stock to eliminate the possibility of scratching. Booth No. C-45.

Sutton Tool Company, Detroit, Mich., is announcing four new items at the Show: a new master type with quick change pads, a master feed with interchangeable pads for hot rolled ground and polished stock, a free stock ball type master

## Cut Costs—Increase Profits—Use "L-W" Products

### L-W 6x6 POWER HACK SAW

**\$147.50**

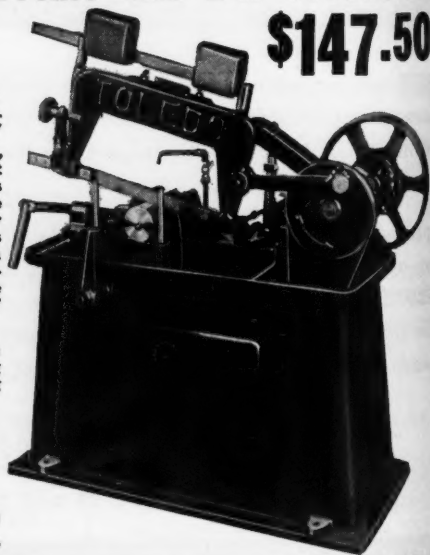
A REAL SAW THAT WILL SAVE YOU TIME AND MONEY. Designed for maximum rigidity, this Saw is accurate and efficient in operation. Automatic trip stops the machine on completion of the cut. Automatic relief of the saw blade on the non-cutting stroke is also provided. To make a clean and compact assembly, the coolant pump is mounted inside the base. Capacity is 6"x6" with 14" Blade.

L-W also Manufactures Magnetic Chucks, Demagnetizers, Dividing Heads, Lathe Chucks and Milling Machine Vises.

Send for a catalog of the complete line.

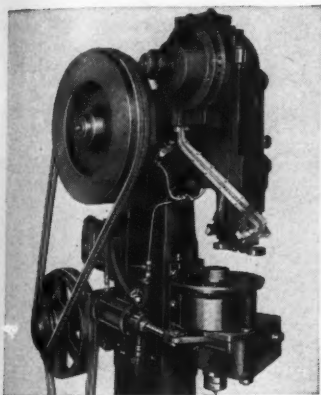
**L-W CHUCK CO.**

20 N. St. Clair St., Toledo, Ohio

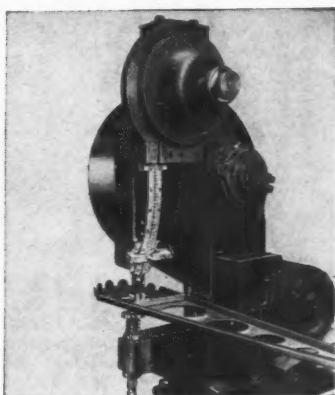


# RIVITOR

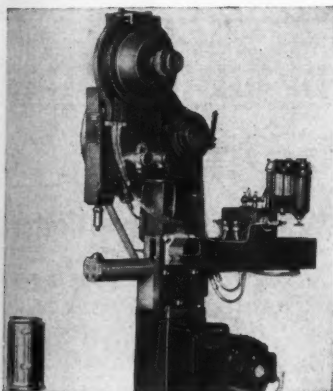
ready serves these industries . . . . .



AIRCRAFT . . .



This is the standard "BR" Bench Type Rivitor tooled for setting  $\frac{3}{8}$ " diameter x  $\frac{3}{4}$ " long duralumin rivets in airplane sections.



CONTAINER . .



This Rivitor sets two rivets at the same time to attach handle brackets to paint pails.

give you more information on the Rivitor in these industries.

**the TOMKINS-JOHNSON Co.**

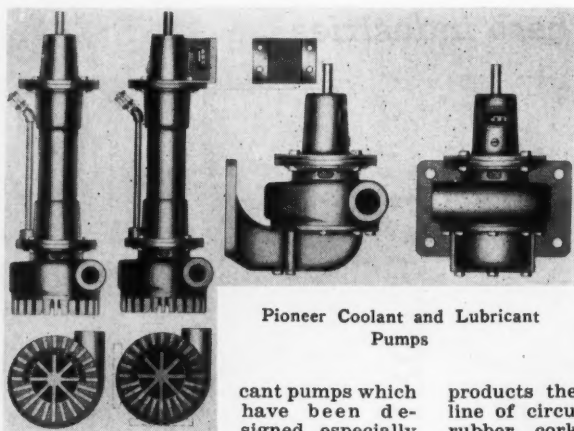
620 N. Mechanic Street, Jackson, Michigan

Agents in principal cities in United States. European Representative: Gaston E. Marbaix, Ltd., London.

Pioneer Engineering and Manufacturing Co., Detroit, Mich., will display a new series of three coolant and lubricant

models.

The Model FV is intended to be merged in and mounted on the die or machine; the Model FB-V may be suspended to the pump, and Model F-VB is designed for close-coupled installation. Booth No. C



Pioneer Coolant and Lubricant Pumps

cant pumps which have been designed especially for use in conjunction with machine tools or auxiliary tanks where the unit must be driven with a flat or V-belt, chain, gear, or flexible coupling, or where it is impossi-

products there will also be exhibited line of circular knives used for cutting rubber, cork, steel, brass, copper, etc. The company recently has developed a saw for cutting brass and copper in tirely the burr usually left in saw cutting. Booth No. A-91.

Circular Tool Company, Inc., Providence, R. I., specializes in the production of circular cutting saws, in standard and special combination drills and reamers.



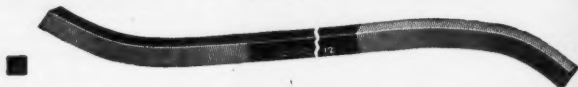
Look for this trade mark

## American Swiss Files of Precision

Tests Prove "AMERICAN SWISS" Files Are Better!

At no higher cost than other makes of Swiss Pattern Files made in the U. S. A., the "American Swiss Pattern File of Precision" will show a saving in time and filing cost.

RIFFLER FILE



## AMERICAN SWISS FILE & TOOL CO.

Buy From the Distributor

ELIZABETH, N. J.

WE MAKE A COMPLETE LINE OF MECHANICS' HAND TOOLS AND KNURLS

**BE SURE TO SEE** the interesting motion picture showing how broaches are manufactured and the complete display of Detroit Broaches in Booth B-60 at the A. S. T. E. Exhibition

# BROACHES

## AND BROACHING FIXTURES

Designed and Manufactured  
**To Do YOUR  
JOBS RIGHT!**

•The job you may be considering to-day may require a broach one inch long or six feet long. It may necessitate the broaching of a complicated internal or external form. It may require a specially designed broaching fixture. Or it may be just a simple broaching job for which only an accurately machined broach of unquestionable quality is needed.

A Detroit Broach will do that job! For, at the Detroit Broach Company, there are competent engineers and thoroughly experienced production men who *know* broaches and broaching operations. They know how to apply their ability to provide the most practical and economical solution to your broaching problems. They're ready NOW to start working with you on that job you're thinking about today.

**DETROIT BROACH COMPANY**  
6000 Beniteau Ave. • Detroit, Michigan



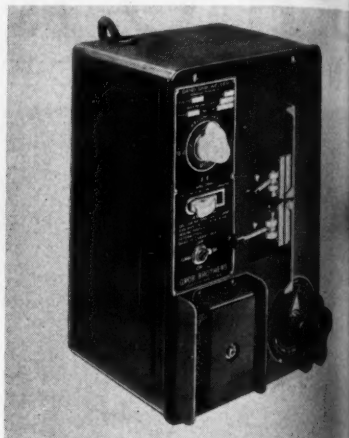
## UNIVERSAL *Collet Chucks*

### FOR PRODUCTION DRILLING

Because of their positive grip on either drill flutes or shanks and because of the easy drill adjustment for depth in multiple drill set-ups or screw machines, Universal chucks are ideal for all single purpose drilling. In addition they are the best tool holders for end mills.

**UNIVERSAL**  
Engineering Company  
Frankenmuth, Mich.

Grob Brothers, Grafton, Wis., have on exhibition the new Grob Type BW Butt Welder which has been developed to weld saw blades from  $\frac{1}{8}$  in. in width. One welder will take care of an entire battery of saw machines. The saw blade clamps are designed to permit positive and accurate line-up of the blade and full electric



Grob Type BW Butt Welder

contact so important for a good weld. After welding, the weld is smoothed by grinding on a grinder that is built into the machine. Booth No. B-54.

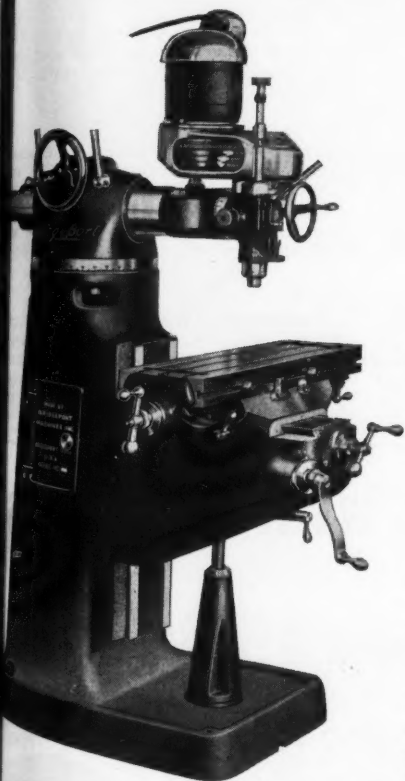
Bristol Company, Waterbury, Conn., feature of this company's exhibit will be its new socket head cap screws, being exhibited along with the complete line of Bristol Socket Screw Products. The socket head cap screws have spline recesses for turning the screw with a spline socket wrench. The screws are made by a patented process designed for producing a socket with splines by extrusion. The process provides a grain structure arranged to give maximum strength in the direction of forces applied to the screw. Booth No. A-13.

Severance Tool Manufacturing Co., Saginaw, Mich., is announcing a new tool for chamfering tubing both inside and outside, and facing the end at the same time. The facing cutter is



# new

## BRIDGEPORT TURRET MILLING MACHINES



- *Flexibility*
- *Rigidity*
- *Unparalleled range*

### FEATURES

Rugged design throughout with 15" diameter turret and 5" diameter overarm.

Large graduated dials 3 1/4" diameter.

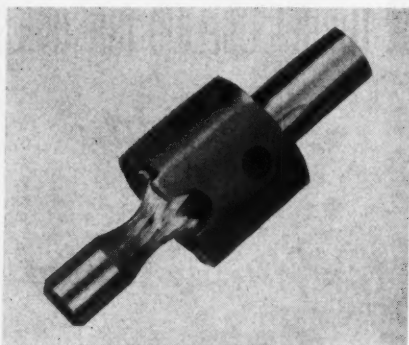
Angular settings in one plane by turning hand wheel which controls keyed overarm.

Extreme sensitivity for fine milling on molding Dies, yet has unusual range for large Tool and Fixture work.

**Write for further details.**

**BRIDGEPORT MACHINES, INC.**  
52 REMER STREET • BRIDGEPORT, CONN.

movable for regrinding independently of the chamfering members. A milled groove gives chip clearance in the front face. This type of cutter may also be



Severance Chamfering Tool

used to burr the ends where slots, keyways or splines are present. Also on exhibit is the company's standard line of midget milling cutters and other tools. Booth No. A-88.

South Bend Lathe Co., South Bend, Ind., through Lee Machinery Co., is announcing a new 14-in. lathe at the show. This lathe has such features as hardened and ground alloy steel spindle, double wall type apron with alloy gears, disc type clutch, semi-steel castings throughout, taper gib and adjustment, motor drive below bed and "V" belt to countershaft and flange to cone.

Also exhibited are the 1-in. and 2-in. capacity lathes as well as other standard sizes. All machines will be in operation. Booth No. A-28.

The Schauer Machine Co., Cincinnati, Ohio, is exhibiting a line of machines designed for high production grinding, burring or polishing of parts. The two-speed motor is completely enclosed. Booth No. B-14.

Tannewitz Works, Grand Rapids, Mich., will exhibit three machines: model 24M Di-Saw, an abrasive cut and mitering machine, and a high speed metal cutting band saw machine.

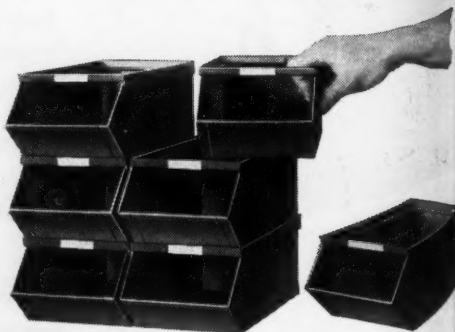
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These full width hopper-fronted stacking bins provide accessible, flexible storage anywhere in your plant. You can save

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**STACKBINS**  
"STACKED AND STILL ACCESSIBLE"



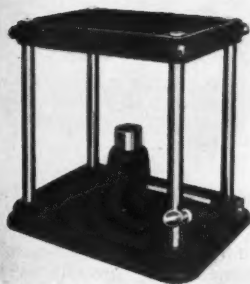
Write today for full information and low prices. Stackbin Corp., 53 Troy St., Providence, R. I.

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TYPE "BB"



**THE FAVORITE with  
Tool Designers, with  
Production Engineers,  
and with Operators.**



TYPE "FL"

*Rely upon us for your  
jig problems. May we  
have your inquiry? . . .*



**THE CLEVELAND UNIVERSAL JIG CO.**  
13328 ST. CLAIR AVE. • CLEVELAND, OHIO



To get real performance from your grinding wheels, they need a good dressing regularly.



The best way to be sure the job is done right, is to use New Improved Vincent - Huntington dressers with bushings that can't turn and wear out the bearing holes in the handle.

These new type Huntington dressers, equipped with cutters heat treated by the "Vincent Process" to the proper degree of hardness and toughness, is your assurance that the dressing will

be well done. Call your nearest Mill Supplies distributor. Insist on the dressers with the aluminum finish.



*Write for descriptive catalog sheets*

**VINCENT STEEL PROCESS CO.**

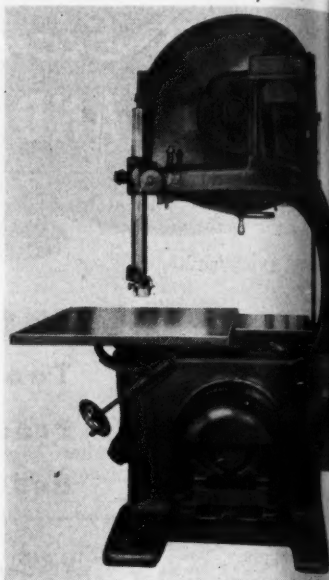
2434 BELLEVUE AVENUE

DETROIT

MICHIGAN

"If it's a Huntington dresser or cutter Vincent makes it."

Lockheed hydraulic 2-wheel braked Di-Saw has just been introduced by the company and is suitable for both external and internal sawing in die and other toolroom applications.



Tannewitz High Speed Metal-Cutting Saw with Lockheed Hydraulic Brake

ability of adjustment and speed variations for the saw blade are distinctive features of the machine. Booth No. B-10.

Colonial Bushings, Inc., Detroit, Mich. In addition to hardened and ground drill jig bushings, this company exhibits samples of a large variety of hardened and ground screw machine parts being produced for manufacturers in various industries. Booth No. A-10.

Dalrae Tools Co., Syracuse, N. Y., exhibiting its Speed-Mill and Milling Mill. Both of these units are equipped with the new Dalrae "Thou-Meter" presetting tools to desired depth of cut. An accuracy of 0.00025 in. plus or minus is guaranteed in 2½ in. of travel with this device. Booth No. B-3.



TRADE MARK



# **GRIFFIN** **HACK SAWS**

● Griffin Special Alloy Hack Saw Blades, made from molybdenum high speed steel, are the result of over 50 years of experience in the manufacture of hack saw blades -- the latest addition to the line.

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INFORMATION.

**New Griffin--Griffin All Hard  
-- Griffin Flexible -- Griffin  
Special Alloy -- Griffin High  
Speed Steel Blades.**

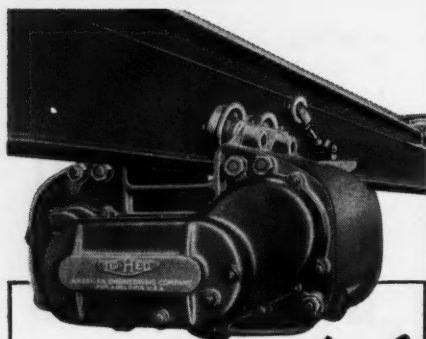
**G. W. GRIFFIN CO. • FRANKLIN, N. H.**

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## For Short Hauls use the PLAIN TROLLEY TYPE A-E-CO LO-HED HOIST

The plain trolley type A-E-Co Lo-Hed hoist—the one you can pull along the rail—is the sensible choice under these conditions:

1. When the haul is short and the load not too heavy.
2. When the path under the hoist is walkable.
3. When the haul is long but seldom repeated.
4. When time is no great factor. For details of this and all other Lo-Hed hoists, send for our new catalog today.



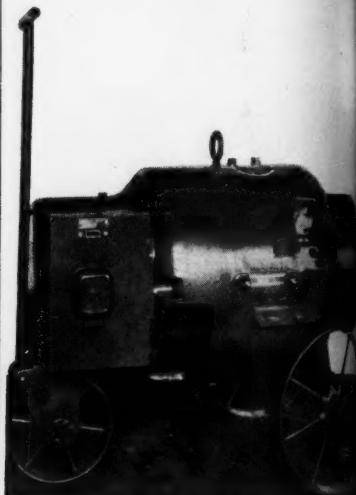
- Available in capacities of 1/4 to 6 tons.
- Operates on Standard I-beams or track of any make.
- Low headroom—stacks materials higher than any other hoist.
- Safe, fool-proof.
- Compact, strong, simply constructed.
- Exceptionally low maintenance.
- Protected against dust, moisture, fumes.
- Heavy duty, ball-bearing HOIST motor.
- Automatic lowering brake.
- Ball or roller bearings at vital points.
- Improved plow-steel cable.
- 100% positive automatic stop.
- Efficient spur-gear drive . . . and
- LO-HED COSTS LESS PER LIFT**

### AMERICAN ENGINEERING COMPANY

**A-E-Co  
Lo-Hed  
HOISTS**

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OTHER A-E-Co PRODUCTS: TAYLOR STOKER UNITS  
MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. new items are being exhibited by Westinghouse at the Show: a 150-ampere a-c transformer type welder, a new 100-ampere motor-generator set type welder, the new Locklite luminaire, and a new Motor Watchman or starting switch. In addition to these, other Westinghouse equipment to be on display



Westinghouse Motor-Generator Set Welder

cludes "Weld-O-Trol" safety switch, linestarters, and circuit breakers; gas motors, splash-proof motors, and proof motors. Booth No. A-44.

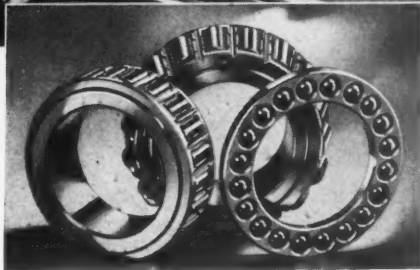
The Lenney Machine and Tool Co. of Warren, Ohio, is announcing a line of variable speed transmissions designed for machine tools and other equipment. The unit is electrical in operation and is infinitely variable as to output speed. Running speed of the output shaft is indicated by a dial located at the top of the unit. Variations in speed are secured by changing the relative position of two discs mounted at right angles which transfer the energy from the motor to the output shaft by means of friction. The design is such that the load on the output shaft increases the pressures between the contact rollers and the driving disc, avoiding slippage. Booth No. B-16.



# BANTAM "ULTRA PRECISION" BEARINGS SET A NEW STANDARD FOR ACCURACY



Through a combination of infinite care by specially qualified workmen and the finest gauges and methods known, Bantam Ultra Precision Bearings are produced to a new high standard of close tolerances.



In the production of Ultra Precision Bearings for spindles and other applications where extreme accuracy is required, Bantam sets a new high standard.

Bantam's exclusive process grinds both inside and outside diameters at the same setting. This assures absolutely uniform wall thickness, allows dimensional tolerances to be held to about one-half those possible by usual grinding methods and assures a degree of concentricity and roundness heretofore unobtainable.

## Helps Improve Quality of Your Product

The extreme accuracy, thus secured, insures that they will run more accurately, last far longer and greatly increase the efficiency and

durability of the parts in which they are installed. Machines equipped with them produce a better, more accurately machined product.

Built in all types — straight roller, tapered roller and ball. A trial will prove to you that these bearings offer outstanding advantages.

If you are already a user of precision bearings, you will find it advantageous to get in touch with us for special information.

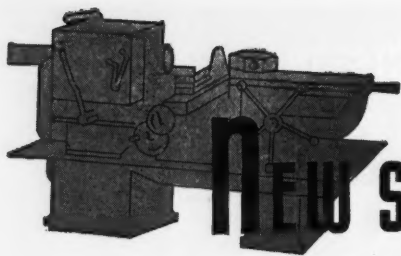
**BANTAM BEARINGS CORPORATION**  
SOUTH BEND, INDIANA



Sole Distributor of  
**THE TORRINGTON CO.**  
Torrington, Conn.

The new Standard Series  
Quill Bearing  
Simplified Design,  
Lower Load Carrying  
Capacity, Lower Cost,  
Easier Installation.

TAPERED ROLLER . . . STRAIGHT ROLLER . . . BALL BEARINGS



# NEW SHOP EQUIPMENT

## Tomkins-Johnson Hydraulic Rivitor

Especially developed for use in the aircraft industry, The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich., presents the Hydraulic Rivitor illustrated herewith. The machine is intended for use in the fabrication of the fuselage and wing structure and was developed to feed and set countersunk head rivets, or round head rivets, if so desired, automatically and with a

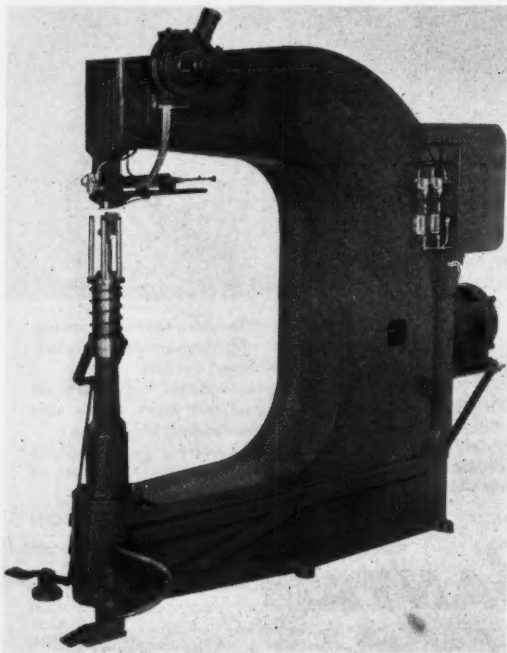
minimum of spoilage.

The features of the machine are: automatic feeding of the rivets, visibility in locating the work on the rivet fast pneumatic operation of the hydraulic valve to facilitate the movement employed for riveting, minimum spoilage, insurance of a completely filled hole without flashing, pedal operation, leaving the operator's hands free, locating and riveting at level, reducing operator fatigue, setting rivets in curved sections as easily as straight sections, pressures up

to 12,000 lbs. available for riveting, equal facility for countersunk or round head rivets, setting of rivets up to and including  $\frac{1}{4}$  in. in length without changing tooling, and uniform pressure applied to each rivet.

As each cycle of the machine is completed, a rivet is automatically selected and positioned for the next operation, thus the operator can see the rivet and can easily locate the work for riveting. With the work positioned, he raises the pedal, holding the work tightly against the rivet head. At the end of the stroke, the operation of a valve effecting the return stroke of the transfer ram. Depressing the second foot pedal causes the ram to recede, another rivet is fed and set, and the work is held at a uniform pressure. As the ram recedes, another rivet is automatically selected and positioned by the ram.

The machine is designed to set rivets up to  $\frac{1}{4}$ -in. diameter inclusive by 1 in. long and to handle up to  $\frac{1}{2}$ -in. length differential without changing tooling.



Tomkins-Johnson Hydraulic Rivitor

## J&L 5 x 30-In. Universal Automatic Thread Grinding Machine

The Jones & Lamson Machine Company, Springfield, Vt., announces a thread grinding machine, to be known as the 5 x 30-in. J&L Universal Automatic Thread Grinder. The standard machine is designed to grind threads of

every type and description up to 5-in. diameter, 12 in. long, anywhere on work 24 in. in length. The machine swings work in diameter and accommodates 30 in. between centers.

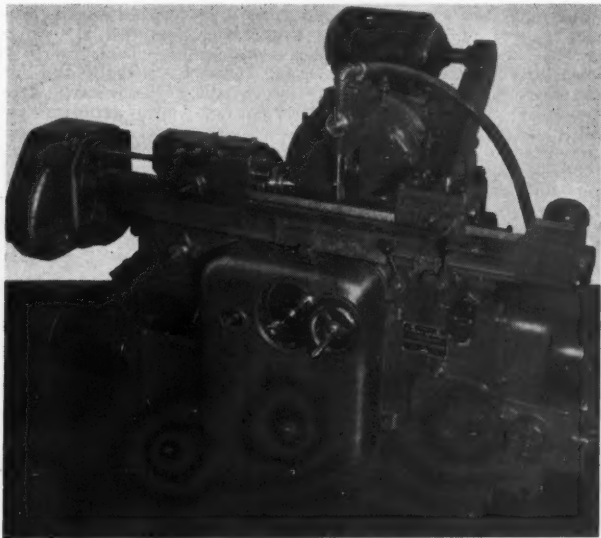
Like the 8 x 48-in. thread grinders manufactured by the same company, the new machine has been designed around the Automatic Wheel Truing Device as the primary element. Accuracy of thread angle is guaranteed within plus or minus  $1/2$  min. on the half angle, lead to 0.0002 in. per inch with a cumulative error not to exceed 0.001 in. in 12 in. On production work the machine will grind threads automatically to a pitch diameter tolerance of 0.0005 inch.

The grinding wheel spindle and its driving motor are mounted on a cradle to permit tilting the wheel to correspond with the helix angle of the thread to be ground. The wheelhead unit operates on roller bearings which ride between hardened and ground rails. Provision is made on the work spindle to compensate for backlash when grinding in both directions.

Speed changes for the work spindle are made through sliding gears on multiple-spline shafts mounted on ball bearings. Positive forward and reverse speeds are provided for two-way grinding any thread within the rated capacity of the machine. Four independent rapid traverse speeds are provided for returning the grinding wheel to the starting position so as to increase the

production possibilities when grinding one direction only.

The tailstock is a lever-operated unit, and the tailstock assembly includes a tungsten carbide tipped center. Adjustment is provided for grinding slight tapers by means of a graduated screw. Tapers of more than a few thousandths, which would naturally affect the lead, are obtained by inserting hardened and ground formers which directly control



J&L 5 x 30-In. Universal Automatic Thread Grinding Machine

the action of the wheel slide and make it unnecessary to compensate for either lead or form on the grinding wheel. With suitable formers, the machine will grind combinations of taper, straight and taper, or double taper threads. It is also possible to apply formers for automatically feeding the wheel in and out of cuts as is sometimes required when grinding a worm thread on a shaft.

The work drive is motor-operated, with push button "start," "stop," and "jog" control. Individual motors are supplied to operate a coolant pump and wheel truing device. Power for the grinding wheel is furnished by an individual motor connected by means of pulleys and V-belts and is also provided with push button "start" and

"stop" control. A control to match threads on the machine is a built-in part of the assembly.

The machine is equipped to feed in the grinding wheel automatically until correct size is reached, at which point the feed is stopped automatically. The wheel also is advanced automatically to compensate for decrease in its size after trueing. After the machine has once been adjusted, these functions are automatic for succeeding work. A separate switch is provided to operate the trueing device at any desired time. It can be left on for continuous dressing as may be required when dressing a new form on the grinding wheel. During the wheel trueing cycle, the wheel speed is automatically slowed down. When the trueing is completed, it returns to its normal speed.

Three types of automatic wheel trueing devices are available. Where only 60 deg. thread forms of slight helix angle are to be ground, a 60 deg. device is furnished which will handle all National thread forms, including "V," straight and taper pipe. A Universal Automatic Wheel Trueing Device with suitable formers will grind straight-sided threads, either symmetrical or

buttresses of any included angle from 15 to 90 deg. inclusive. The Pantograph Automatic Wheel Trueing Device, with suitable formers, will grind Whitworth A.P.I., drill pipe or buttress threads with round top and bottom. The trueing devices are interchangeable between the 5-in. and 8-in. machines.


The standard machine will grind single, double, triple, quadruple and multiple threads, and includes pitch change gears for all pitches from 2 to 48 inclusive—a total of 33. The machine will grind right hand threads having helix angles up to 35 deg. and left hand threads up to 30 deg. All motors and controls are furnished.

Standard attachments are available for grinding relief on taps and bolts of the lathe, The American Tool Works Company, Cincinnati, Ohio, has developed one for internal thread grinding.

### "American" Fixed Gap Bed Lathe

For handling work with large flanges or projections beyond the normal swing of the lathe, The American Tool Works Company, Cincinnati, Ohio, has developed

*"The Blade in the Plaid Box"*



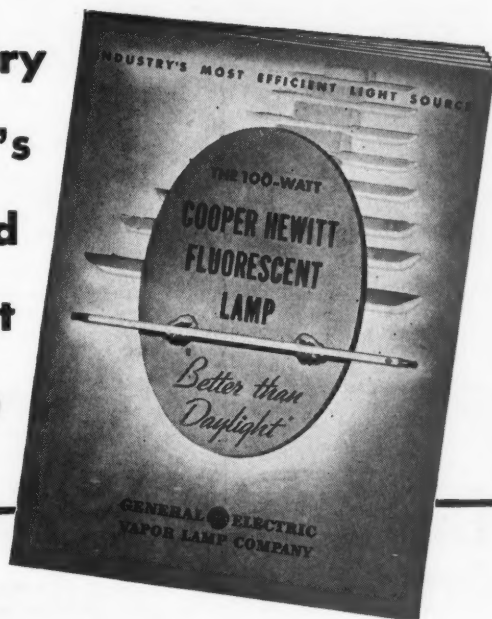
**LENOX**  
HACK SAWS  
BAND SAWS

**Have YOU Investigated**  
the superior craftsmanship and economy of **LENOX BLADES?**  
Furnished in "High Speed," "Mo-Speed," "Tungsten" and "Super-Flex" for every metal cutting job.

Sold by Distributors everywhere . . . **TRY THEM!**

# THIS NEW BOOK...

**gives the story  
of industry's  
newest and  
most efficient  
light source**



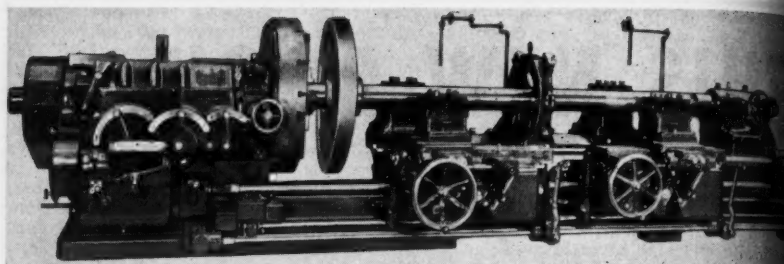
Higher, more productive illumination levels at less cost. Elimination of annoying shadows, glare and eye-fatigue. These are some of the many advantages of this new blue-white industrial light source.

Write for a copy of this book. It's freely offered. General Electric Vapor Lamp Co., 897 Adams St., Hoboken, N. J.

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901P

**HIGH LIGHT OUTPUT  
HIGH EFFICIENCY  
LONG LIFE  
COOL BLUE WHITE LIGHT  
ELECTRICAL CHARACTERISTICS  
RECTIFIED AC ARC CIRCUIT  
LOW INSTALLATION COST  
NO DARK SHADOWS  
NO EYE FATIGUE  
DUST TIGHT  
SPECIFICATIONS  
FOOT CANDLE TABLE**



“American” Fixed Gap Bed Lathe

oped a fixed gap bed lathe in 36, 42 and 48-in. sizes.

The lathes are proportioned for 40 to 50 h.p. motors and are supplied in various bed lengths to suit the maximum length of the work to be machined. Eighteen spindle speeds are provided, 12 of which are secured through a powerful face plate drive. The head transmission is through hardened steel ground or lapped gears of exceptionally generous proportions, ensuring low gear tooth and bearing pressures which result in long life and minimized maintenance. The entire head

mechanism is automatically oiled by means of a pump circulating oil which forces all the oil through a filter to thoroughly cleanse it before use.

A filler block for the gap may be furnished to close the gap when machining work of normal diameters close to the face plate.

### Signal DS-5 Bench Drill Stand

A bench stand which, with the Signal OB-5 1/2-In. Drill, can be converted

## This cracked die repaired with CERROMATRIX produced a million



Trigger die of Daisy Mfg. Co. cracked, as marked on photograph, soon after it was made. Pieces were located in oversized recess in plate with set screws through edges. CERROMATRIX was then poured into the recess around die, which has since produced over a million pieces.

Send for booklet.

**CERRO DE PASCO COPPER CORPORATION**  
44 WALL STREET • • • NEW YORK, N. Y.

BRITISH ASSOCIATES: MINING & CHEMICAL PRODUCTS LTD., LONDON, ENGLAND  
CANADIAN REPRESENTATIVES: DOMINION MERCHANTS LTD., MONTREAL, CANADA





## OUT OF DATE—OUT OF POCKET

...may be literally true unless your material specifications include Molybdenum steels. Present production problems and costs demand these improved materials. Here is one of Moly steel's many successes.

A manufacturer of a large line of valves for operation at sub-zero temperatures required a steel having good impact properties at temperatures down to 150 degrees below zero F. Many different parts were involved.

Chrome-Molybdenum (SAE 4140) steel is standard in this case because of its

established ability to meet strict low temperature impact specifications.

In addition this Chrome-Moly steel is keeping material and production costs within competitive limits. It is yielding the additional profit that always comes from standardization. Substantial fabrication economies are also being obtained.

Our booklet, "Molybdenum in Steel", which contains a great deal of practical data, will be gladly sent free on request to technical students and others interested in improved materials.

PRODUCERS OF FERRO-MOLYBDENUM, CALCIUM MOLYBDATE AND MOLYBDENUM TRIOXIDE

**Climax Molybdenum Company**  
**500 Fifth Avenue New York City**

**MOLY**



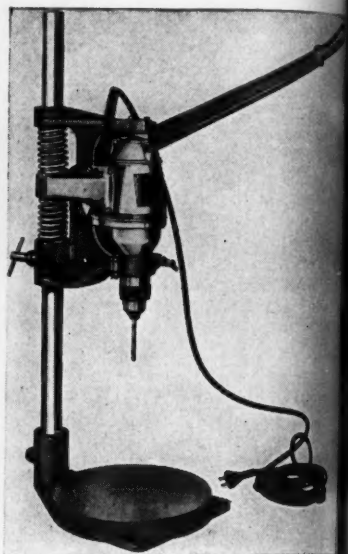
**GIVEN DEPTHS**  
Diagrams illustrate  
"Feed-as-you-need"  
combinations for ex-  
acting depth require-  
ments.

The outstanding tool design development of two decades. Use straight shank drills (whole or broken) — Use entire drill or any part of it for given depths — use for single or multiple operations.

Send for detailed information  
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**Scully-Jones & Company**  
1913 S. ROCKWELL STREET, CHICAGO

ly and quickly into a practical and convenient stationary drill press is announced by Signal Electric Mfg. Co., Menominee, Mich. The stand, illustrated here, is designated as the DS-5 Bench Drill Stand. Its use is said to greatly



Signal DS-5 Bench Drill Stand

increase the work range of the Signal DS-5 Drill.

The stand is substantially made of steel, stands 32 1/2 in. high above the 14 in. diameter base, the column being 14 in. diameter.

### Sheldon "Metal Worker" Lathe

The Sheldon Machine Co., Inc., 100 S. Cottage Grove Ave., Chicago, Ill., now marketing the Sheldon Model 10-In. Back Geared Screw Cutting Precision Lathe, to be known as the "Metal Worker." The Metal Worker is designed especially for use in small shops and toolrooms and for garages and by craftsmen where an accurate, sturdy, easy-operating, and versatile lathe is required. The swing of the lathe is 10 in. and it is made in bed lengths of 26 in. and 44 in. to handle work up to 10 in. long.

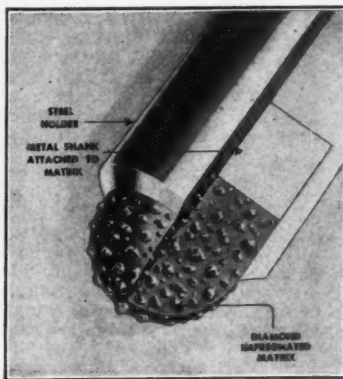
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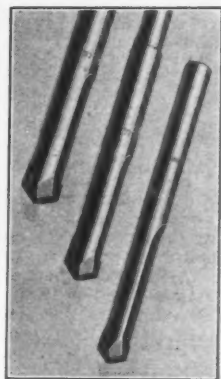
# SUPER 5 Star PRODUCTS



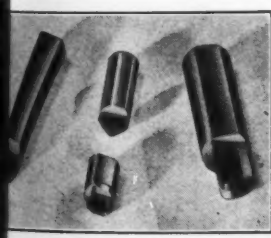
**SUPER**  
Dento Diamond  
Point Penetrators  
For Testing Hardened  
Steel



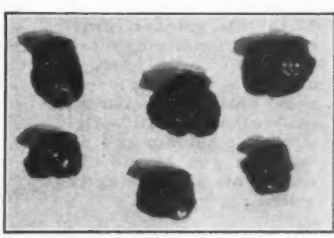
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The New Manufactured  
Diamond for  
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Wheels.

SEE OUR EXHIBIT — BOOTH No. A-22  
A. S. T. E. MACHINE & TOOL PROGRESS EXHIBITION  
DETROIT, MARCH 14 - 18, 1939

## SUPER TOOL COMPANY

650 Hoover Road      DETROIT, MICH.      Phone ARlington 1500

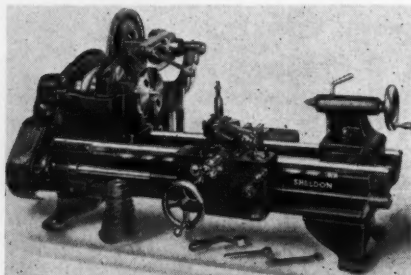
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March, 1939

vided with a number of cross girts to provide strength and rigidity. The bed has two flat ways and two V-ways, accurately machined and scraped. The headstock is of the webbed, bowl type,

feed is hand operated.

The lathe is available as a bench or with floor legs, with or without and oil pan.



Sheldon "Metal Worker" Lathe

rigidly supporting the spindle bearings. The design includes hob-cut semi-steel or steel change gears, over-size hardened steel spindle, ground all over, with a 1½-in. hole. Gears are furnished for cutting threads from 4 to 112 per inch. The carriage is provided with automatic power longitudinal feed. The cross

## Doall Model V-36 Die Making Machine

The illustration shows the Model Doall Die Making Machine which has been brought out by Continental Machine Co., Inc., 1301 S. Washington Ave., Minneapolis, Minn. The new machine is of massive, rugged construction, with 36-in. throat and work height capacity of 10 in. It is built of arc welded steel and the housing also serving as the frame of the machine. The work table is 18 in. square and 2½ in. thick, of box construction, and tilts in four directions.

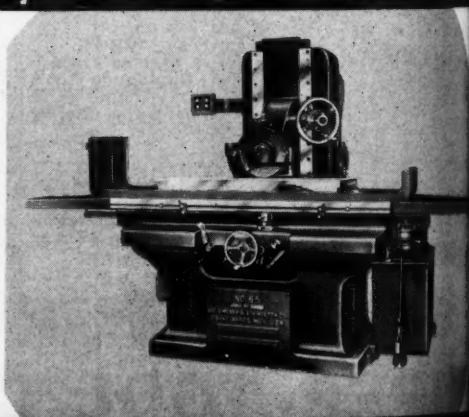
The machine is powered by a 1-hp motor which drives the machine through a "Speedmaster" Bakelite pulley and silent transmission. The Speedmaster pulley provides an infinite variety of speeds ranging from 0 to 1,500 feet per minute. A tachometer dial, conveniently located, indicates the speed.

## NO. 65 GRAND RAPIDS Hydraulic Feed Surface Grinder

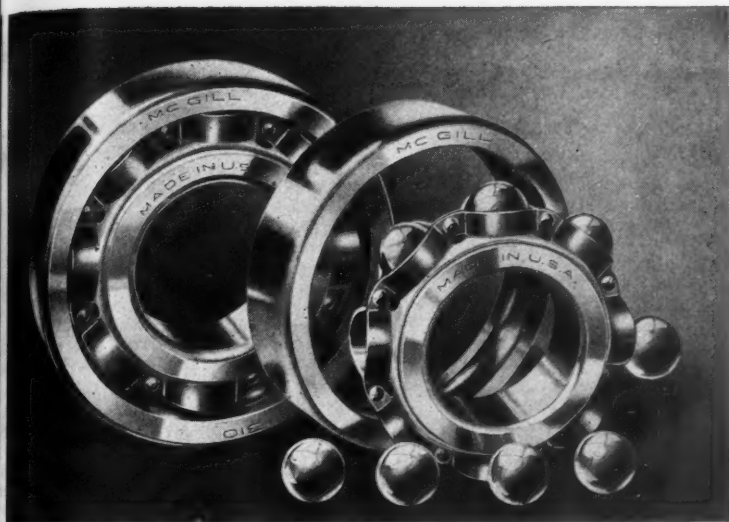
With this grinder, practically any longitudinal table speed up to 125 feet per minute is instantly obtainable. Vertical adjustments, calibrated to .0001"—rigid, one piece column and base—assure you of the highest degree of grinding precision.

Operated correctly with the proper grinding wheels, you can grind any material at maximum speed.

Write for catalog GL100



**GALLMEYER & LIVINGSTON CO.** 308 STRAIGHT AVE. GRAND RAPIDS, MICH.



## MCGILL Bronze Land-Riding Retainers

For replacement use in industrial machinery, McGILL Precision Ball Bearings embody those features of design and construction which are consistent with a product of high quality. Many well known manufacturers are using them on their equipment.

In addition to standard bearing sizes, we are in position to make exceptionally quick deliveries on manufacturing orders for special bearings of any type or size.

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## MCGILL Bronze Retainer

### ① Extra Strength

Sturdier retainer construction is obtained because of additional support between ball pockets. Ball wear is eliminated as retainer rides on land of inner race.

### ② Cool-Running

Bronze gives least resistance to steel, dissipates heat quickly, prevents crystallization.

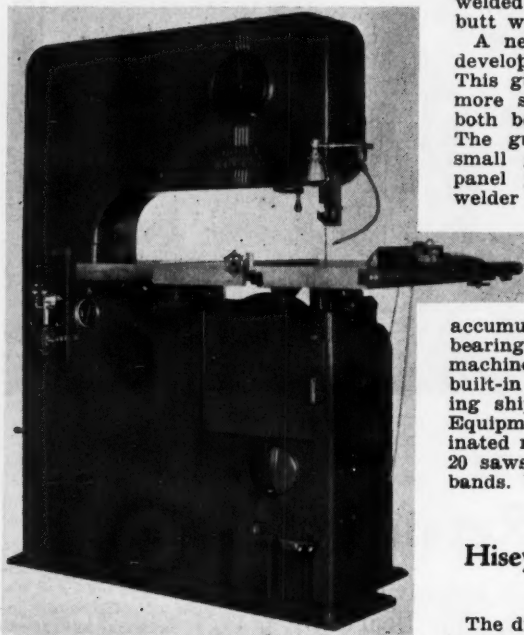
### ③ Free-Rolling

Cylindrical ball pockets do NOT cramp balls. Minimum contact prevents balls from wearing out of round.

## MCGILL MANUFACTURING COMPANY

1500 N. Lafayette Street  
VALPARAISO • INDIANA

speed at all times. The correct speed to use for contour sawing is also shown on another dial, called the "Job Selector." The transmission contains eight helical gears which run in oil.



Doall Model V-36 Die Making Machine

The machine will cut shapes and contours in any metal or other material. It cuts at a rate of  $1\frac{1}{2}$  in. per minute in 1-in. tool steel or  $3\frac{1}{2}$  square in. per minute in cast iron. There is practically no limit to the work thickness capacity.

The cut leaves a slit only  $\frac{1}{16}$  in. and the saw cuts without distorting the metal. A saw which costs approximately 80 cents per band will last more than 600 square in. of cuts. Saws for internal cuts are built welded into bands with an automatic butt welder built into the machine.

A new type of saw guide has been developed especially for this machine. This guide holds the back of the saw more securely and closer to the work both below and above the work. The guide is adjustable for wear. A small grinder wheel, mounted in a panel just under the automatic butt welder for removing the flash of weld on the saw band, is driven by a  $\frac{1}{4}$  h.p. motor.

A new piston-type pump is employed for the machine, yet, to keep chips from accumulating at the point of work, ball bearings are used throughout the machine. The wiring is centered in a built-in junction box, each machine being shipped ready to tap in and run. Equipment includes a three-power illuminated magnifying glass for close work, 20 saws, two files, and three polishing bands. Weight, 1,775 pounds.

## Hisey Heavy Duty Wet Drill Grinder

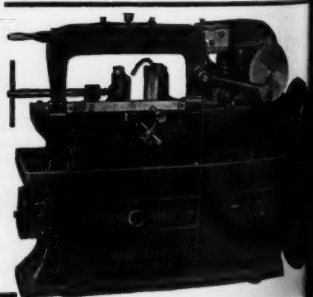
The drill grinder shown in the illustration has been developed by The Hisey Wolf Machine Co., Cincinnati, Ohio, especially for grinding straight or twist shank drills with two, three or four flutes, also flat or chucking drills, flat twisted drills and drills with various size shanks. A small drill holder is provided with which straight or twist shank twist drills from No. 60 to 1/2 in.

# RACINE

High Speed Metal Cutting Machines—  
Variable Volume Hydraulic Pumps and  
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Atlas Press Company  
Kalamazoo, Michigan

Jan. 25, 1939

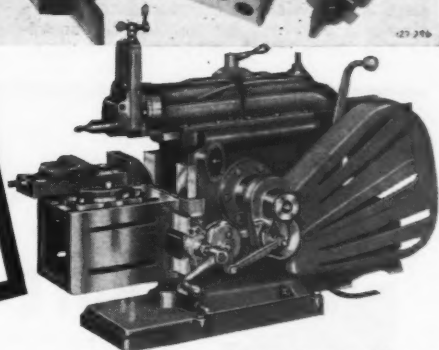
Gentlemen:

It affords us great pleasure to state that the Atlas shaper which we recently purchased from you performs all the work that we ask of it and then some.

This machine was first used in our die department, and it machined our dies accurately. We now have it in our production department and are perfectly satisfied with it in every respect, and should we be in the market for additional equipment, we would certainly add another Atlas.

Very truly yours,  
*C. V. Morse*  
C. V. Morse  
Production Manager

CVE-11

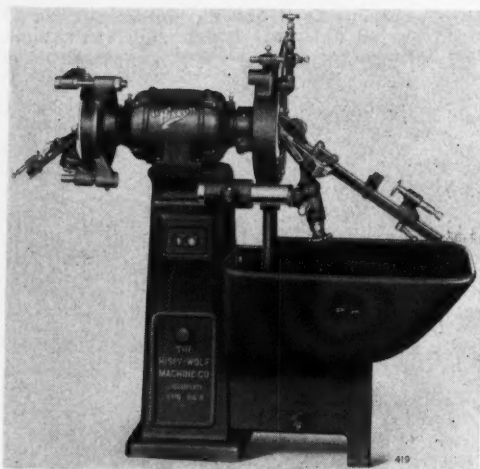


All kinds of precision shaping jobs up to a 7" stroke can be set up and finished quicker and cheaper with this new Atlas Shaper. It costs just \$215—takes a ½ H.P. motor. Drive is crank type powered completely by V-belts from motor to bull gear pinion. 4 speeds, 5 automatic cross feeds. See your dealer for a working demonstration or send for Catalog 30.

**BOOTH A16  
ASTE EXHIBITION  
DETROIT, MARCH 14-18**

**ATLAS PRESS CO.** 346 N. PITCHER ST.  
NEW YORK—130 W. 42nd St. Kalamazoo, Michigan  
CHICAGO—35 E. Wacker at Wabash  
PHILADELPHIA—113 N. Third St.

**LATHES · DRILL PRESSES · ARBOR PRESSES · SHAPERS**



**Hisey Heavy Duty Wet Drill Grinder**

can be ground to the standard 59 deg. angle at the point and 12 deg. clearance angle without adjustment. A snap clamp is provided for holding the smaller size drills. Both holders are designed

to support the drills in V-grooves with no clamping or clamping necessary. A screw feed mechanism allows equal angles and lip length.

The pump, which is driven by a V-belt from the motor, is used for priming and supplies a constant stream of coolant directly at the point of grinding. All grit is moved from the water by a separator before the water is returned to the reservoir. The reservoir is provided with a large drain for flushing when necessary.

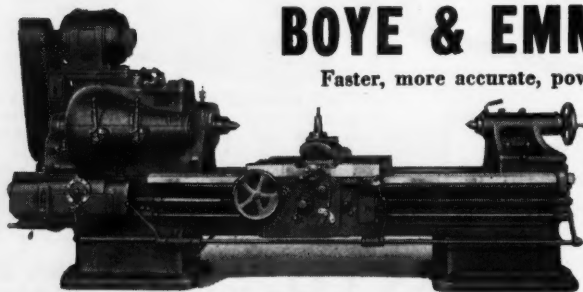
The machine is made in two types employing a 60 cycle, 115 or 220 volt, two or three phase motor, 220 or 550 volts, or D.C. motor of 220 or 230 volts. The smallest size employing both small and large holders, will grind drills from 60 to 2½-in. diameter. The larger sizes will grind drills from 1½ to 2½-in. diameter. The smaller sizes are 18½ in. between wheels and 20 in. on the large size. Height to center of spindle is 30 in. in all cases. Weights, respectively 500 and 590 pounds.

## *Announcing* the Newly Designed

**Model "E"—24-inch**

# **BOYE & EMMES LATHE**

**Faster, more accurate, powerful and convenient**



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If asked to symbolize "precision", the layman might well sketch a Micrometer. But to the skilled mechanic there is also another symbol: the Lufkin trade-mark, which for years has been associated by men in industry with precision tools of the finest quality.

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March, 1939



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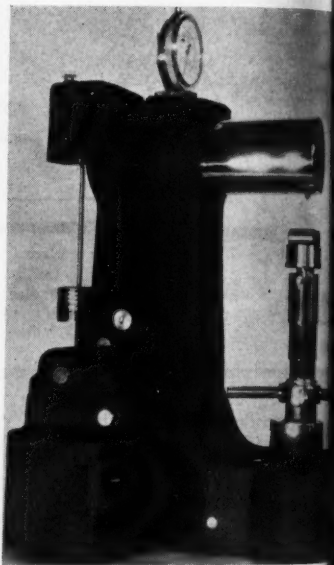
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## Rockwell Hardness Tester

A new model hardness tester furnished either as the Model 3-CR "Rockwell" Hardness Tester or the Model CS "Rockwell" Superficial Hardness Tester, designed for the purpose of internal testing of large tubes and cylinders, has been announced by the Mechanical Instrument Co., Inc., 1303 River Ave. and 143rd St., New York, N. Y. The cylindrical tube being tested is simply projected over the horizontal



Rockwell Hardness Tester

testing arm. The machines can also be used for testing outer surfaces. The models are made in an 8-in. vertical capacity, 6-in. horizontal reach, and will test internal surfaces down to 1/2 I.D.

The same sensitivity and accuracy built into these special models as in the regular line and they have the same durable precision and rugged construction. Correct application of both minor and major loads is ensured through patented, frictionless, free-floating plunger system and mathematically correct loads and leverages. The operation is semi-automatic through motor operation. Standard readings are obtained from the machines.

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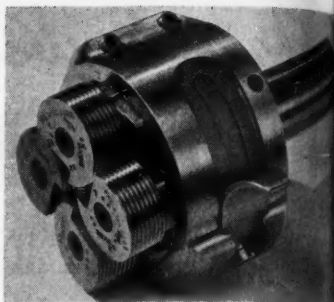
MODERN MACHINE SHOP 177

One of the most interesting applications of these instruments, in several plants, is in the testing of airplane engine cylinders having nitrided surfaces.

## National Acme Die Head

The National Acme Company, Die Division, 170 East 131st St., Cleveland, Ohio, announces a newly designed die head for Brown & Sharpe Automatics. The head is built in sizes of  $\frac{1}{4}$ ,  $\frac{3}{8}$  and  $\frac{1}{2}$ -in. capacities and uses the standard or special ground thread circular type of chaser.

Among the features of head construction is an adjustable compensating float which "cushions" the chasers onto the work, preventing torn or distorted threads at high spindle speeds. Two methods of closing the die are provided; either held closed under tension while the turret indexes, or closed in the last position just prior to threading by a simple stop arranged to arrest the forward travel of the die slide. Selection of the closing method may be made to accommodate the number of other tools used and to ensure positive per-



Style DBS Combination Threading and low Mill Head for B. & S. Automatics

formance under fast indexing of machine turret.

Quick adjustment to diametric cut size is by means of only two screws which move all the circular chasers (with holding blocks intact) uniformly and at the same time. This eliminates individual chaser adjustments said to gain production in setting.

Circular chasers mounted on holders are removed for resharpening by loosening one screw, and by the use of

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**MARQUETTE**  
MANUFACTURING CO., INC.  
MINNEAPOLIS, MINN.

## The MARQUETTE

### A.C. ARC WELDER

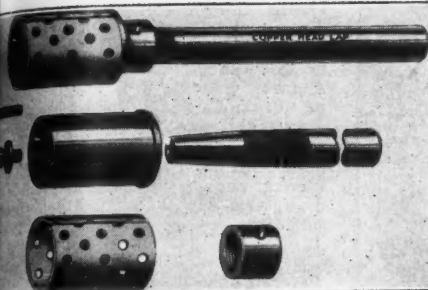
Pays through SAVINGS—Manufacturing plant

everywhere have found that the savings in production and maintenance costs have paid for their Marquettes in a very short time. In many instances, the difference between repairing and replacement cost on just one job have paid for the welder.

**Pays through PROFITS**—Job welders are making money with the Marquette because the initial and operating costs are low. The welds produced are strong, dense and ductile. The alternating current continuously and automatically reverses polarity thus puddling the molten metal, floating impurities to the bottom where they form a slag, and leaving a weld of the highest quality.

Marquette A. C. Arc Welders are listed by Underwriters' Laboratories, Inc.





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With Copper Head Expansion Laps. Profitably used in hundreds of leading shops. Available in sizes from  $\frac{1}{8}$ " to  $2\frac{1}{2}$ ", graduated by sixteenths of an inch.

Many other designs for special applications.

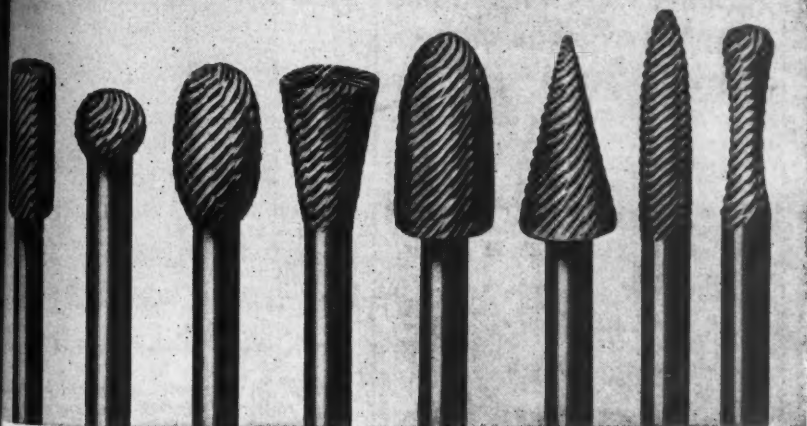
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## Wire-Working Machinery Wire Mill Equipment

**Sleeper & Hartley, Inc.**  
*Designers and Builders*  
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## GROBET HAND CUT ROTARY FILES



Photograph shows actual sizes

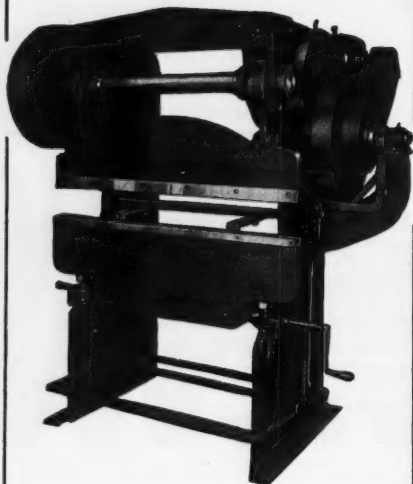
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No. 253



**does 40% to 60% of the  
forming work turned out  
by the average shop.**

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

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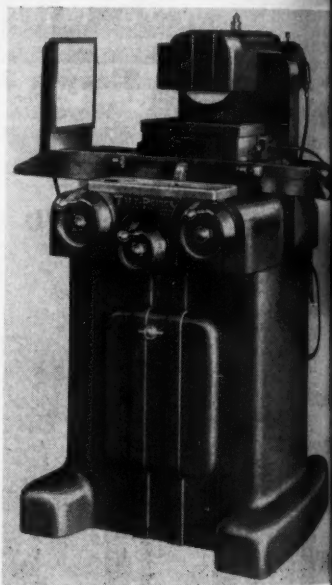
**7418 LOOMIS BLVD.  
CHICAGO ILLINOIS**

sizing micrometer fixture. When turned to the head the cutting is not changed, therefore no adjustment is necessary after grinding. Chasers provide for 270 deg. of rotation on circumference.

Chasers can be changed to milling and forming tools simply by substitution of cutters and blocks, thus a combination tool is available with single tool holder (head) investment.

## Taft-Peirce Precision Surface Grinder

Announcement is made by The Taft-Peirce Mfg. Co., Woonsocket, R.I. that a precision surface grinder of this design will be shown at the A.S.

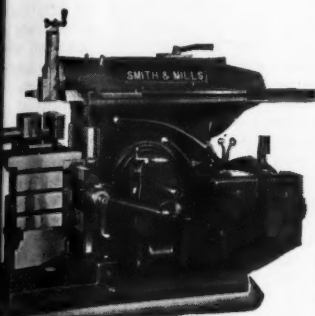


Taft-Peirce Precision Surface Grinder

Show in Detroit. Originally designed and built for use in the company's tool and gage division, the machine has been perfected to a high degree of accuracy.

The machine is compact in size, is of heavy, sturdy proportions. Bearings are employed on all rotating

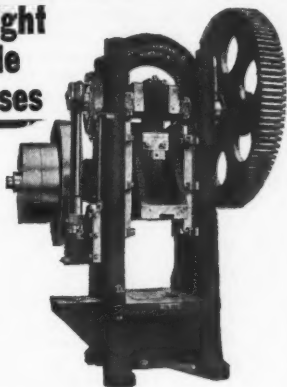
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Automatic lubrication—forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke. Power rapid traverse to cross feeds.

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## Straight Side Presses



Outstanding in every detail for heavy blanking and forming work. All stresses are taken centrally.

Write for new catalog illustrating and describing this and other presses.

**Zeh & Hahnemann Co.**  
184 Vanderpool St. Newark, N. J.

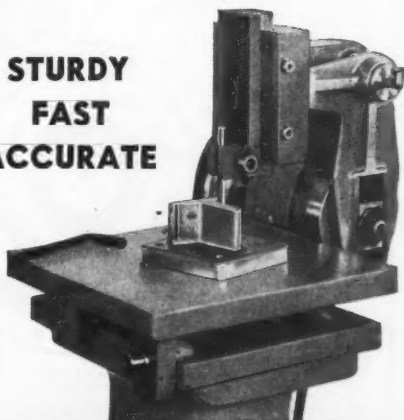
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(Patented)

Machine finish your punches.  
Eliminate the slow, tedious hand method.

Guaranteed to cut your cost.  
See and description on re-

**STURDY  
FAST  
ACCURATE**



**BRICKNER • KROPF MACHINE CO., Inc.** MUSKOGON, MICHIGAN

shafts, with ball tacks of hardened alloy tool steel to control the table, saddle, and spindle column travel. This construction permits the uniform, parallel and retilinear motions so necessary in accurate surface grinding, eliminating the inaccuracies which may arise from variations in temperature, oil film, or wear of the table and saddle ways.

Friction is minimized by the use of ball bearings so that table travel is free and a minimum of effort is required of the operator for the hand feeding commonly employed on high precision small work. The spindle column is exceptionally heavy, and is mounted so that the wheel may be positioned for depth of cut with utmost precision. The wheel spindle is mounted so that it can be swiveled in a vertical plane about the center of the wheel, thus greatly simplifying the set-up and adjustment. It is often possible to finish surfaces with the angular face of the wheel instead of the side, thus saving time and wheel wear in dressing and producing a better finish.

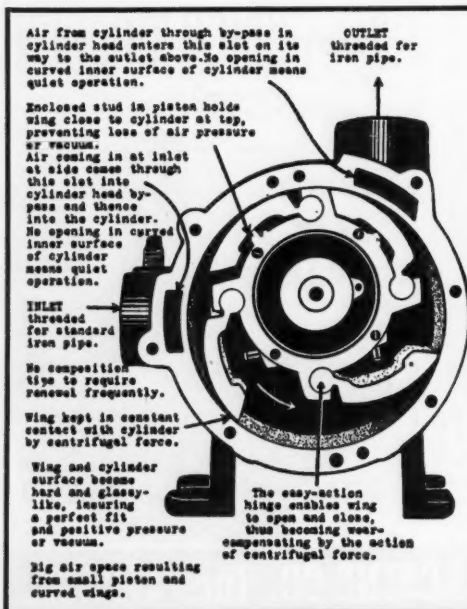
The Taft-Peirce Precision Surface Grinder is 5 x 12 in. Height under wheel, 12 in. Weight, 1,500 pounds.

## V & O Press Improvements

The V & O Press Company, Hudson, N. Y., has added some notable features to the high speed press and fixture made by this firm. The solenoid is now used to trip the machine and to stop it at the end of the cycle, working in conjunction with a limit switch. A foot switch is used to release the solenoid, making the treadle unnecessary, reducing the amount of effort required, and making it possible for girls to operate these machines without undue fatigue. The switch can be located in any position best suited to the operator.

The limit switch, which automatically releases the solenoid, stops the machine at the end of the cycle, eliminating the need of the throw-out mechanism previously used. With these additions considerable time is saved in changing the machine from one job to another over the time formerly required.

Another feature is an expanding holder by the use of which laminations can be notched accurately without the use of a keyway. The expanding holder is similar to a split collet, but is opened by means of a draw-in



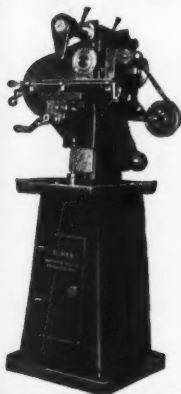
## LEIMAN BROS. PATENT HIGH PRESSURE BLOWERS AND VACUUM PUMPS GAS BOOSTERS AIR MOTORS

For Gas Furnaces -- Boilers  
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Makers of Good Machinery For Fifty Years

## BURKE Milling Machines



Burke motor driven milling machines, Nos. 1, 2, 3 and 4 are specially suited for handling small, difficult work on a production basis.

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**BURKE MACHINE TOOL CO.**  
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## Janette

### Motorized SPEED REDUCERS

Sizes from 1/50 to 7 1/2 H.P.



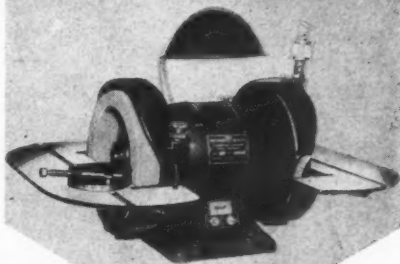
We offer 10 different styles from which to choose the exact reducer to meet your individual requirements.

Bulletins and recommendations on request.

ALSO ROTARY CONVERTERS—  
BLOWER WHEELS—MOTOR GENERATORS

**Janette Manufacturing Company**  
556-558 West Monroe Street  
Chicago

## PROSSER Cemented Carbide Tool Grinder



**\$97.50  
COMPLETE**

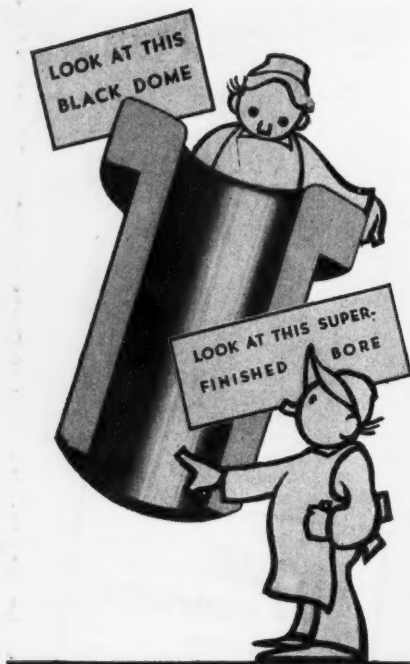
**10 DAYS  
FREE TRIAL**

Don't take our word for it that this grinder will increase the life of your tools and reduce tool breakage—Try it out and convince yourself.

This grinder removes metal fast when rough grinding and finish grinds smooth, keen cutting edges.

Write for details.

**Thomas Prosser & Son**  
120 WALL ST. NEW YORK



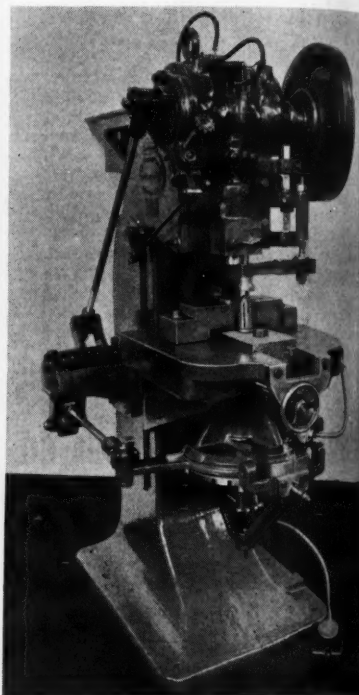
## UNIVERSAL

OFFERS MORE FOR  
YOUR BUSHING DOLLAR

Again Universal leads with two more improvements in their Drill Bushings. Super-Finishing the bore insures greater accuracy and vastly improves wearing qualities. The Black Dome is rust-proof and adds to the appearance of your tools.

**UNIVERSAL**  
Engineering Company  
Frankenmuth, Mich.

which is actuated by the solenoid. At the end of the cycle, the draw bolt is released, permitting the disc holder to contract and leaving the notched lamination loose on the spindle. This design



Redesigned V & O High Speed Notching Press

facilitates loading and unloading of the laminations and saves time in stacking the discs, as it is unnecessary to lift up the loads in relation to a keyway.

### Fafnir Improved Pillow Block

A recent announcement by The Fafnir Bearing Company, New Britain, Conn., states that, in addition to its many other advantages, the Fafnir Ball Bearing Rubber Pillow Block is now offered with a grease fitting for out-of-the-ordinary conditions. This fitting permits frequent lubrication if desirable — and with the least amount of trouble. The new Rubber Pillow Block has met with



## SMALL TOOLS

Long Length Drills  
Special Size Taps  
Carried in Stock

High speed and carbon drills, taps, reamers, milling cutters, hollow mills, end mills, drill rod, die sets, etc.

Send for catalog.

**VICTOR MACHINERY EXCHANGE**  
(Incorporated)

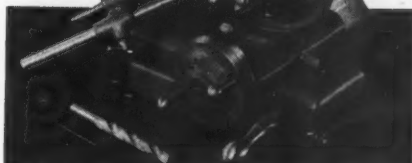
81 CENTER ST. NEW YORK CITY

## SELLERS DRILL GRINDERS

Produces the Point recommended by Leading Drill Manufacturers—the point that cuts faster, drills through more inches of metal per grind, requires less power, produces holes that are true cylinders of accurate size. Write for catalog and prices.

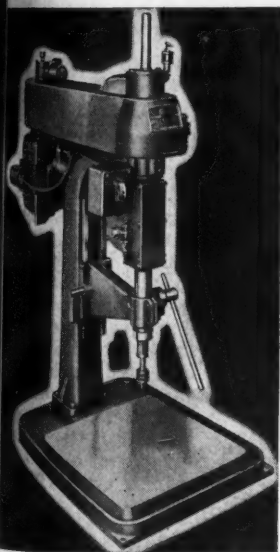


Model shown is No. 05-D  
Capacity— $\frac{1}{16}$ " to  $\frac{1}{2}$ " Drills



**WM. SELLERS & CO. INCORPORATED**  
1600 HAMILTON STREET  
PHILADELPHIA - PENNSYLVANIA

**Sellers**



*Perfect Laps-*  
**FASTER!**

**LAPPING MACHINE**



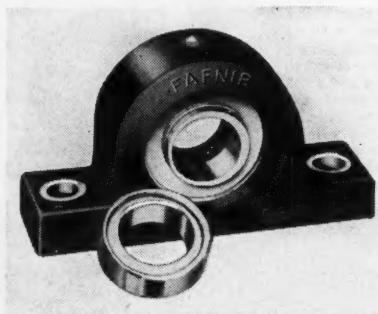
**RECIPROCATING  
SPINDLE . . . . .**

• Lap to a mirror finish with extreme accuracy, quickly, inexpensively, with the new Onsrud S-76 Reciprocating Spindle Lapping Machine. Three spindle speeds, three speeds of spindle reciprocation. Adjustable stroke. Save money on lapping costs.

Write for Bulletin

**ONSRUD MACHINE WORKS, INC.**  
3916 Palmer Street Chicago, Illinois

increased acceptance by air-conditioning and ventilating equipment manufacturers all over the country. Its moulded rubber housing eliminates any



Fafnir Improved Pillow Block

slight bearing noise and compensates for partial misalignment or longitudinal shaft expansion. The Fafnir Wide Inner Ring Ball Bearing with exclusive self-locking collar incorporated in its design provides an exceptional degree of shaft support as well as ease of installation.

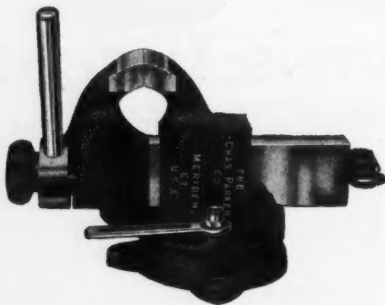
## R. M. B. Miniature Ball Bearings

Ball bearings of unusually small dimensions, designed for use in the construction of small motors, recorders, clock-work mechanisms, speed indicators, pressure gages, and other delicate and precise mechanisms, are now being marketed by Landis & Gyr, Inc., Dept. 1401, 104 Fifth Ave., New York, N. Y. The bearings are intended especially to fill the needs of the design engineer who is confronted with the problem of eliminating friction and at the same time producing a durable and sturdy product. The bearings are made in sizes of from 1.5 mm (slightly less than 0.060 in.) diameter up to 12 mm (slightly less than 0.5 in.) diameter and other sizes are available.

R. M. B. Miniature Ball Bearings are made from strips of special steel. The races are thin enough to use comparatively large balls, thus reducing ball speed and assuring quiet operation. Ball bearings, except the 1 and 1.5 mm sizes, have very strong but light ball cages. The balls are of uniform hardness and each is highly polished to an accurate sphere. The bearings are designed and manufactured to very close

NEW

## PARKER'S PRODUCTION VISE A TIME SAVING ELEMENT ON ANY REPETITIVE WORK



This vise has a cam action on the slide and screw with a throw of  $\frac{1}{4}$ ". Open the vise (by turning the knob in front of handle) approximately  $\frac{1}{8}$ " more than width of piece to be held. Lock the screw by means of the thumb screw at the end of the screw.

Turn the handle to upright position and insert the piece—a slight touch of the handle—the vise is locked! Release by a mere touch of the handle. Made in  $3\frac{1}{2}$ ", 4",  $4\frac{1}{2}$ " stationary and swivel base Machinist type and 4" Filers type Vises.

DETAILED INFORMATION ON REQUEST

**THE CHARLES PARKER CO., Meriden, Conn., U.S.A.**

all Bearings

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## NEAT STAMPING

in  
NAME  
PLATES



This machine quickly stamps details and serial numbers into name plates.

*Write for Particulars*

**GEO. T. SCHMIDT, Inc.**

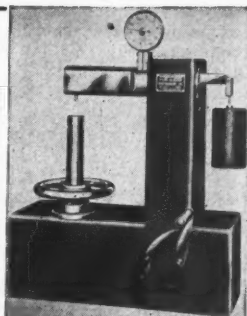
1006 Belle Plaine Ave.

Chicago, Ill.

## PYRO ELECTRO

Internal  
Hardness  
Tester

*Model "HT"*



For Rockwelling Hubs, Tubes, Rings, Bushings, etc., without the use of Goose-neck adapters; and for all external testing.

Direct Reading hardness numbers in "C," "B," "A," etc., scale. No dash-pot. Speedy, accurate operation.

*Write for complete catalog.*

**Pyro-Electro Instrument Co.**

7323-S W. Chicago Blvd., Detroit, Mich.

## BEFORE and AFTER "HALLOWELL" STEEL WORK-BENCHES

are taken apart and moved to a new shop location because of changed production needs and there set up again, they are firm and rigid, perfect for the most exacting workman's requirements. Remember that...BEFORE and AFTER moving, the "Hallowell" is rigid. How unlike a wooden bench that is nothing but kindling wood after being disassembled.

"Hallowell" Steel Work-Benches are most inexpensive to buy...they last indefinitely and have tops that stay smooth as a surface plate.



Fig. 732  
Pat'd and  
Pat's Pending  
Drawer is extra.



Fig. 847  
Pat'd & Pat's Pending

## STANDARD PRESSED STEEL CO.

**BRANCHES**

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DETROIT

INDIANAPOLIS

**JENKINTOWN, PENNA.**

Box 556

**BRANCHES**

CHICAGO

ST. LOUIS

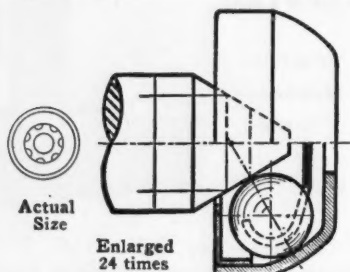
SAN FRANCISCO

Over 1300 bench combinations available, so your needs can be filled exactly...right from stock, without delay. Get our catalog that tells all about them.

S.A.

tolerances; however, for particularly exacting requirements, high precision bearings are available at slightly higher cost.

R. M. B. Miniature Ball Bearings are



R. M. B. Miniature Ball Bearings

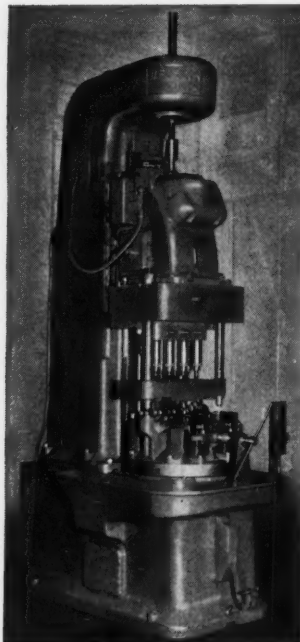
easy to mount and are easily adapted to any requirements. The radial types are fitted in the same way as standard bearings in general use. Axial types C, P and O are pressed into holes which may be milled, bored or cut in any other fashion with a tolerance of 0.01 to 0.03 mm according to size. These

types may also successfully be used bakelite or similar materials. R. M. B. Ball Bearings present no special installation problems, the specific conditions usually dictating the practice to be followed.

## GuildSander

A 9-lb. portable electric belt sander which is said to bring new speed, efficiency and convenience to metal finishing operations, to be known as the A-2 GuildSander, has been placed on the market by the Syrause GuildTool Company, Syracuse, N. Y. This compact sanding unit was especially designed for the workman who desires a portable type sander for sanding, surfacing and refinishing operations.

The GuildSander is light in weight and operates in any position. It is designed to have the power to do all types of sanding and the adaptability to sand all straight or slightly curved surfaces. The front pulley is adaptable to a spindle sander. Where paints, varnishes and other surfacing materials must be removed, the use of the GuildSander is said to save time and labor.



USE OUR  
**912** for  
DRILLING-BORING

### A MONEY SAVER BECAUSE...

- It's built of standard units—low initial cost.
- Positive, controlled hydraulic feed lengthsens life of cutting tools—lowers maintenance cost.

### FLEXIBLE BECAUSE...

- Short runs—low production can be handled with tooling and fixture changeovers.
- High production—long runs handled with automatic cycles and index.

### RELIABLE BECAUSE...

- It's designed by a firm with 67 years experience in building drilling machinery.

### OTHER FEATURES...

- and applications are incorporated in our new 912 booklet—write to us for your copy.

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ROCKFORD, ILLINOIS

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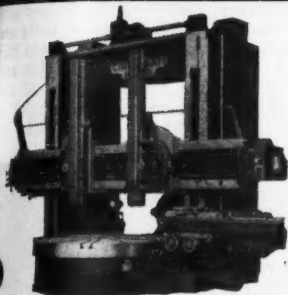
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ES CO.  
LINO

March 1939



## VERTICAL BORING MILLS PLANERS, Double Housing, Upside CRANK PLANERS PLANER TYPE MILLERS

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THE CINCINNATI PLANER CO.  
CINCINNATI OHIO

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Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by endless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple handles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.  
Silliman Ave. Bridgeport, Conn.

## DO-ALL CUTS COSTS



At Doehler Die Casting Co., Pottstown, Pa.  
Usual time, formerly drilled and milled, 80 hrs.  
DO-ALL Contour Sawing . . . . . 26 hrs.  
Saving . . . . . 54 hrs.

Plus saving end mills, drills and machine released for other jobs

## MOST MODERN METHOD

Contour sawing is a new method of machining, recognized as the fastest precision method of removing metal. It cuts out internal and external shapes from any metal up to 10" thick.

## DOES WORK OF THREE MACHINES

DO-ALL is a moderately priced, rugged, precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings. The narrow saws are inexpensive and users say DO-ALL is the busiest machine in the shop.



Let a factory trained man bring a DO-ALL to your plant and show you what it does, what it saves on your own work.

FREE New Handbook on Contour Machining, 100 pages of valuable metal working helps.

CONTINENTAL MACHINES, INC.  
1306 S. Washington Ave., Minneapolis, Minn.

- ☐ Send data and Special prices on the DO-ALL
- ☐ Send Free Handbook

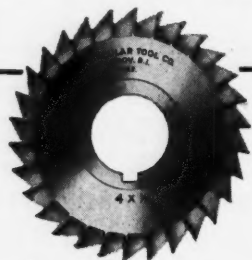
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**"With a Reputation"**

Circle "R" products are made by an organization of experienced saw specialists. Properly used, they are guaranteed to give entire satisfaction.



**Metal Slitting Saws  
Screw Slotting Saws  
Jewelers' Slotting Saws  
Commutator Slotting Saws  
Piston Ring Saws**

Also a Quality Line of

**Combination  
Center Drills**



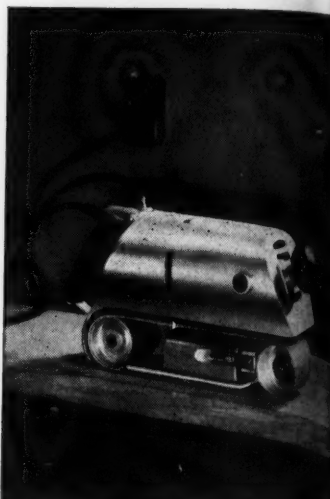
Write today for catalog, which gives complete specifications and prices.

**CIRCULAR TOOL CO., Inc.**  
PROVIDENCE RHODE ISLAND

**Branch Offices:**

Chicago, Detroit, Indianapolis, Dayton,  
Toledo, Cleveland, Philadelphia,  
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The tool is built with a die-cast aluminum frame, finished in baked aluminum enamel. The abrasive belts are the endless type, and travel 600 ft. per minute. The belts are 2 in. wide and 1 in. long and are furnished in all standard grits. The belts may be changed completely by means of a patented



**Guild Sander**

and release spring plate. The Guild Sander is equipped with a 110 volt universal motor that plugs into any socket, either A.C. or D.C.

## AFO Combination Angle Plate and V-Block

The combination angle plate and block illustrated is now being marketed by Linotype Parts Company, 203 Lafayette St., New York, N. Y. The tool is especially intended for use by draftsmen and inspectors and is designed to increase efficiency by saving time.

With this tool cylindrical or flat pieces can be held firmly for drilling, grinding or inspection. All faces are said to be absolutely square or parallel to each other. The large V is in the exact center of the block and the slots make possible the use of various forms of clamps for holding work.



We're NOT At the Show

## WALTON TAP EXTRACTORS

"Show" to best advantage in your shop, at your convenience — or when you break a tap!

Sizes from No. 4 to 1½".

2-, 3-, and 4-flute styles.

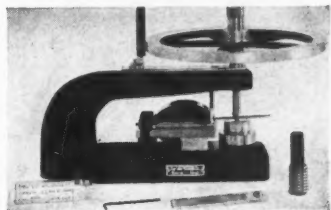
Write for Folder 132 with prices and details of 30-day Free Trial.

*Every Tool Must Sell Itself*

**THE WALTON CO.**

11 ALLYN STREET, HARTFORD, CONN.

## THE LIGHT WAVE MICROMETER



### A Better Way To Measure

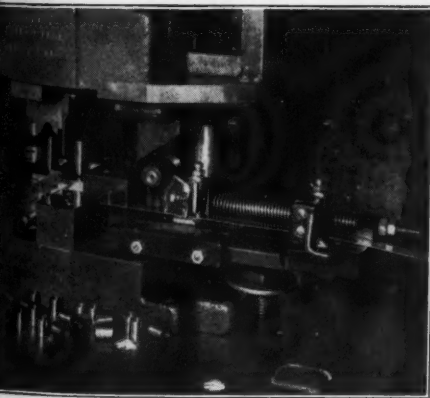
The micrometer duplicates readings to .00001" and measures at any pressure from 0 to 2½ pounds. It eliminates personal errors and will give results within ¼ "Tenth" without gage block standards.

Range 0 to 1" or 0 to 2".

Send for our new catalog just out, describing the micrometer and other new tools.

**THE VAN KEUREN CO.**  
WATERTOWN MASS.

## HITCH FEED EQUIPPED DIES! SAVE REAL MONEY!



**OLD** punch presses will produce up-to-date requirements — automatically too, when Dickerman Hitch Feeds are used. **SO SIMPLE**—that after a little study you will die designs you have dreamed of but never quite dared.

**COMPLETE** instructions for installing and using this effective Hitch Feed are sent with each machine.

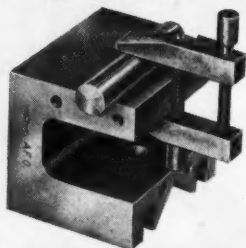
**INVESTIGATE** the low cost of Hitch Feed and its companion — the Dickerman Die Feed — for heavy stock.

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Folder No. 84 giving complete details.

**H. E. DICKERMAN MFG. CO.**  
284 WILBRAHAM ROAD  
SPRINGFIELD, MASS., U.S.A.

The material from which the tool is made is a high grade oil hardening die



**AFO Combination Angle Plate and V-Block**  
steel, thoroughly heat treated and with a Rockwell hardness of 63-64. The size of the block illustrated is 2,500 x 2 1/8 x 2 1/8 inches.

### Improved Combination Vise

A combination vise designed for use by tool and diemakers and inspectors, intended to serve a wide variety of purposes and machined to precision meas-

urements, is now being marketed by Linotype Parts Company, 203 Lafayette St., New York, N. Y. The tool weighs but 7 lbs., yet will serve most demands made on it both in the toolroom and production. The vise is of machined steel, pack hardened, and accurately ground overall.

The jaw opening is 3 1/8 in.; the depth is 1 in., and the width is 2 1/4 in. The vise is attached to a base in such manner that it can be tilted at any desired angle up to 50 deg., the surface being graduated for accurate setting.



Improved Combination Vise

## RIGID thin blade cutter wheel



*Forged* for more  
and cleaner pipe cuts



Capacities  
No. 1 - 1/2"-1 1/4"  
No. 2 - 1 1/4"-2"

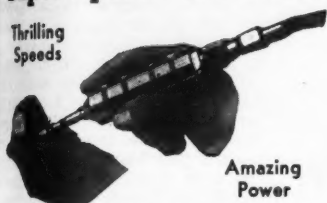
• You know the added toughness and durability of forged steel—these blades assembled in solid hubs—thin for better faster cutting that solve your hurr problem, forged to assure many more cuts per blade, and you money.  
The RIGID Cutter always cuts true because steel reinforcing makes it warp-proof. You like the efficient "feel" of it, the easy spinning size. For better, easier pipe cutting and lower cutter wheel expense order RIGID from your Supply House today.

THE RIDGE TOOL CO., ELYRIA, OHIO

## RIGID PIPE TOOLS

## The IMPROVED M-B "Super-Speed" Air Grinder

Thrilling  
Speeds



Amazing  
Power

• Steel construction throughout... Positive quick-acting air control valve. Operates on air pressures of 40 - 100 pounds. The only hand grinder with spindle speed of 100,000 R.P.M. on 100 pounds air pressure. Also other models and air line filters and automatic air line lubricators.

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### M-B PRODUCTS

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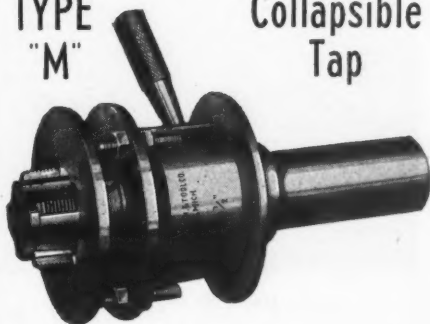
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TYPE  
"M"

Collapsible  
Tap



A universal machine tap that can be used as a stationary tap with handle or as a rotating tap by removing handle. Instant trip at set point.

Chasers are rigidly supported and are hooked into tapered seat of the hardened and ground center pin to insure positive opening and closing.

May we send folder?

## MURCHEY MACHINE & TOOL CO.

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MICHIGAN

Also Self-Opening Die Heads. Bolt and Pipe Threading Machines. Pipe Cutting-off Machines. Double End Reaming, Chamfering and Drilling and Threading Machines.

## Mark It Quickly with a NUMBERALL

Made with 1 to 10 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping. Platform for stamping Name Plates and other small articles.

No. 43  
Platform



NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

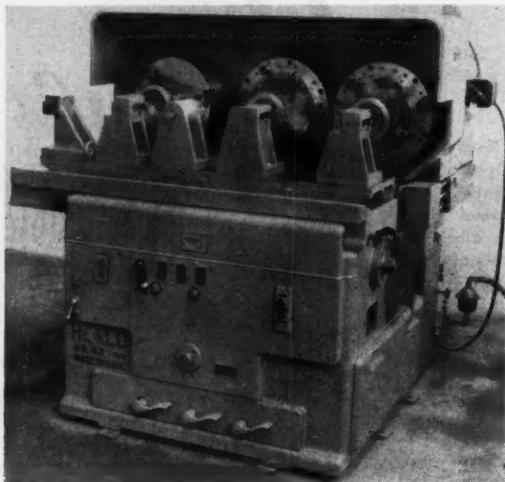
### NUMBERALL STAMP & TOOL CO.

Huguenot Park,  
Staten Island, N. Y.



## Heald No. 42 Bore-Matic

The Heald Machine Company, Worcester, Mass., announces as the most recent addition to its line the Heald No. 42 Bore-Matic, a heavy duty precision boring machine designed for multiple operations on large heavy work. Unique



Heald No. 42 Bore-Matic

in design, the No. 42 provides two tables which have relative hydraulically controlled movement at right angles.

The No. 42 offers a number of features which are said to make it a particularly desirable and efficient machine for precision finishing many types of heavy work. These features include: 1. Capacity to handle long, awkward work or large diameter work. 2. Multiple operations can be performed on several dif-

ferent parts, or progressive operation on several similar parts, including boring, turning, plunge grooving, planing, facing and generated facing in the same automatically controlled cycle with automatic indexing between stations. 3. Wide faces can be finished in a generated cut, in addition to other operations.

4. Work can be either rotated in fixtures or held stationary on the table. 5. All stations are easily and equally accessible from the front of the machine, providing great convenience in loading and adjusting tools. 6. Minimum floor space required. 7. While the machine is essentially a precision finishing machine, it has the necessary rigidity and weight to perform roughing operations needed.

The No. 42 Bore-Matic consists of an extremely rigid massive base having two tables of ways on which are mounted two tables at right angles. The front table slides on ways parallel to the front of the machine, while the rear table has a movement perpendicular to the travel of the front table. The front table provides support for mounting either tool holder or stationary work fixtures. The rear table accommodates boring heads as well as the

driving motors and jackshafts. Boring heads on the rear table may be equipped to rotate either work fixtures or tool holders.

Both tables are actuated by separate hydraulic cylinders controlled by a single throttle but with independent control of feeds by means of individual valves conveniently located at the front of the machine. Feeds are infinitely adjustable within the range provided. The tables also travel at rapid traverse

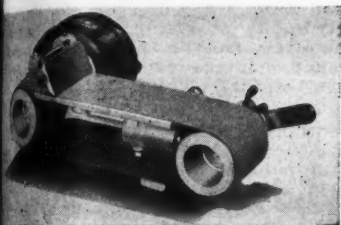
## COLUMBIA'S



# JFS • Jr. VARI-SPEED CONTROLS

Speed control is vital to efficient production. Use this simplest and most practical variable speed transmission ever offered industry. Standard belts used — 5-1 speed ratio — fractional to  $7\frac{1}{2}$  H.P. — and low in cost.

WRITE TODAY FOR FURTHER PARTICULARS  
COLUMBIA VARI-SPEED CO. • WHEATON, ILL.



## NEW ABRASIVE BAND GRINDER..

An Inexpensive

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding wheel to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

**HORMEL-M GRINDER**

WALLS SALES CORP.

WARREN ST. NEW YORK, N. Y.

## Why Use A Shaper to cut Keyways when a

### DAVIS KEYSEATER

will do the job so much quicker and better?

Send for Circular



**DAVIS KEYSEATER CO.**

Exchange and Glasgow Sts.  
ROCHESTER, N. Y.

## PORTABLE BLUE LINE PRINT MACHINE

### ELPRO PORTABLE PRINTER

IDEAL FOR—Shop, Laboratory or Office.

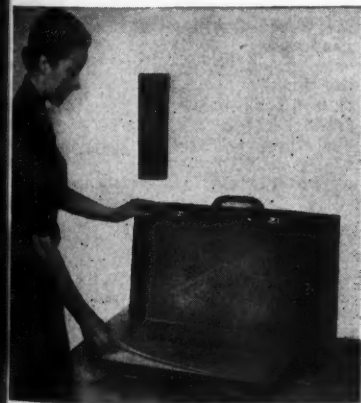
Simple to Operate.

Prints Up to 12"x18" for less than 2c per print.

Complete—Printer and Developer for Ozalid Dry Process Paper—

Price **\$50.00** Net

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## ELECTRONIC PRODUCTS MFG. CORP.

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ANN ARBOR, MICHIGAN



## Again You'll Find *Interested Crowds* in the PUTNAM BOOTH At The A.S.T.E. Show

Last year the Putnam booth at the A.S.T.E. Machine and Tool Progress Exhibition was thronged with interested visitors. They wanted to know why Putnam Tools "cut faster and last longer." They asked for—and received—all the facts on every Putnam product. Today, hundreds of those visitors are regular customers of this company.

Perhaps you want to know how Putnam Tools can help to increase your production and lower your tool costs. We're prepared to show you at Booth B-66 at this year's show. Or, if you cannot be there, write TODAY for full information. We're willing to wager that, when you learn the facts, you, too, will be a constant user of Putnam Tools.

# PUTNAM TOOL COMPANY

2981 Charlevoix Ave., Detroit, Mich.

and from the work and for indexing. Hydraulic pressure for both tables obtained from a single motor-driven pump mounted within the base at the rear of the machine.

This design is said to make the No. 42 Bore-Matic an exceedingly flexible machine both in character of work that can be handled and in number of operations that can be performed in one cycle. Forward movement of the rear table provides the stroke for boring, turning, plunge grooving and planing facing operations. Movement of the front table provides for generated boring operations and indexing. Both of these table travels are combined to produce a cycle that can be modified to meet the particular requirements of the customer's part. If desired, the No. 42 can also be furnished with a locking front table for straight boring only.

Specifications for the No. 42 are as follows: length and width of base on floor, 54" x 48 in.; total floor space, 6' x 77 in.; feeds, front table, 1 to 28 in. per minute; feeds, rear table, 1 to 18 in. per minute; maximum travel of front table, 12 in.; maximum travel of rear table (depending on length of base furnished), 6 or 12 in., and net weight (without heads and fixtures), approximately 12,300 pounds.

### Parker Production Vise

To the line of machine and bench vices made by The Charles Parker Co., Meriden, Conn., has been added a production vise illustrated herewith. The vise has been designed to effect a saving in time in assembly work, production filing, and similar operations. The feature of the vise is the cam action of the slide and screw, which has a throw of  $\frac{1}{4}$  in. To use, the vise is opened approximately  $\frac{1}{8}$  in. more than the

## TRICO

THE U.S. PATENT

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### SAVE TIME—OIL—WORRY



**OPTOMATICS and LEVOMATICS** maintain a constant level of oil in ball bearings.

The **DRIP-DROP** is a thermal oil dropping oil on the bearing from the top exactly as needed.

**TRICO FUSE MFG. CO.**  
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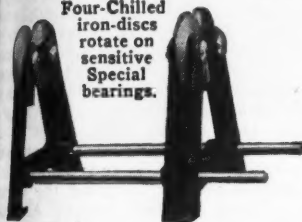
# Improved Anderson Balancing Ways

No Leveling  
Required  
A simple and  
excellent de-  
vice for bal-  
ancing,  
straightening  
and truing.

They are made in  
the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

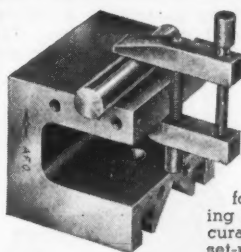
Four-Chilled  
iron-discs  
rotate on  
sensitive  
Special  
bearings.



Write for Full Information

Write to **Anderson Bros. Mfg. Co.**  
1828 Kishwaukee St. Rockford, Ill.

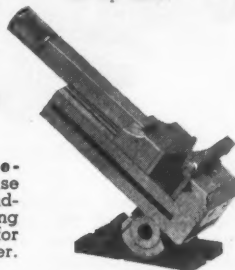
# Combination Angle Plate and V-Block



A precision  
tool that  
holds cylin-  
drical or flat  
pieces firmly  
for drilling, mill-  
ing or grinding. Ac-  
curate . . . saves  
set-up time.

# Combination Vise

A compact, pre-  
cision tool for use  
on surface grind-  
ers. Jaw opening  
—3 1/4". Send for  
10-day trial offer.



**LINOTYPE PARTS COMPANY**  
203 LAFAYETTE ST. • NEW YORK

# REDUCE YOUR DRILL GRINDING COSTS

with a

# BLACK DIAMOND

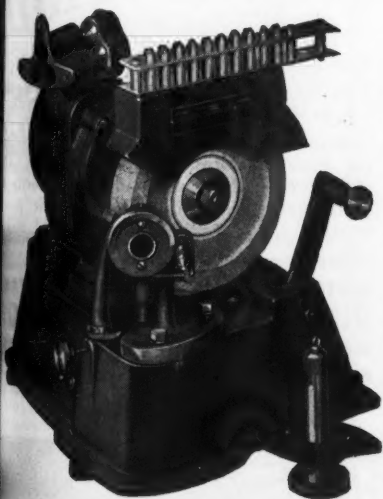
**BLACK DIAMOND Precision Drill Grinders** guarantee the simplified, fast and accurate drill grinding that quickly pays for the cost of the machine.

No adjustments are necessary on drills No. 60 to 3/4".

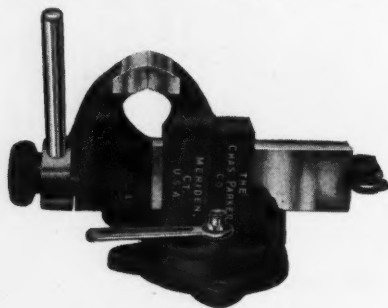
Install a **BLACK DIAMOND** in your shop and see how it will reduce your grinding costs. Write for Bulletin No. 121.

**BLACK DIAMOND**  
**SAW & MACHINE WORKS, INC.**

45 NORTH AVE • NATICK, MASS.



width of the piece to be held and the screw is locked by means of a thumb screw at the end of the screw. The handle is turned to upright position and



Parker Production Vise

the workpiece is inserted, then by a slight touch of the handle the vise is locked. This same simple action releases the workpiece.

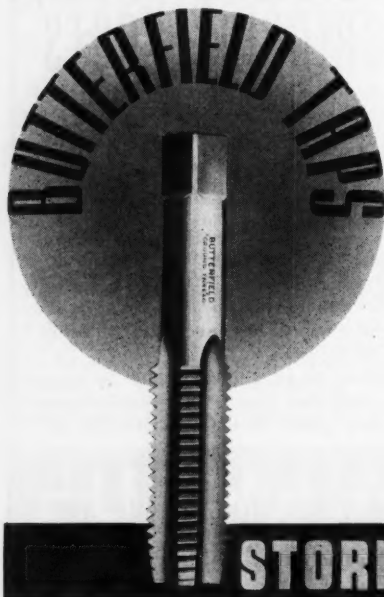
The vise is made in three sizes, with jaws of  $3\frac{1}{2}$ , 4 and  $4\frac{1}{2}$  in. to open to the same dimensions. The vise can be supplied on a stationary base to weigh

36, 57 or 64 lbs. or on a swivel base weigh 43, 60 or 77 pounds.

## Starrett No. 828 "Wiggler" or Center Finder

The illustration shows a handy inexpensive tool which has been developed by The L. S. Starrett Co., Allston, Mass., for jig and tool work in mill machines, drill presses and similar mechanical machines where it is necessary to locate working points with considerable accuracy. The tool, to be known as Starrett No. 828 "Wiggler" or Center Finder, consists of a spring-tension pointer held in a tapered shank with the pointer free to "wobble."

With the center finder set in the chuck or tool holder of the machine, the pointer guided to true concentricity is a simple matter to bring the working point of any job into perfect alignment with the machine spindle. The tension of the spring which bears on a ball at the end of the pointer can be adjusted by a screw in the back of the handle. This spring cushions the pointer and protects it against damage or distortion if the center finder is brought into



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You buy threads, tap life and the resulting profits that taps give you.

Compare Butterfield taps with other brands for accurate threads and long life. The difference will reveal the superiority of Butterfield Taps and their profit possibilities.

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Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

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Worms, Internal Gears, Ratchets, Spurs, Bevels, Spirals, etc.  
FOR PRECISION INSTRUMENTS, MACHINE TOOLS & LARGER MACHINERY

There's one way to get extra gear service in your machines—and that's to use Abart cut gears. Not only do Abart gears have longer life but they minimize replacements and give a longer profit by less maintenance of your machines. No stocks—made only to your specifications or B/P. Send us your specifications for estimate.

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Many types and sizes in stock for immediate shipment. Write for catalog today.

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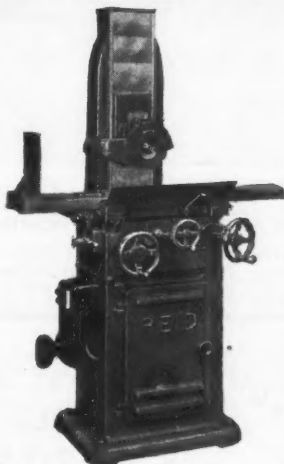
GEAR AND MACHINE CO.  
MANUFACTURERS OF  
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Announcing

# The REID No. 2

Improved  
Automatic-Feed

# SURFACE GRINDER



FEATURING:

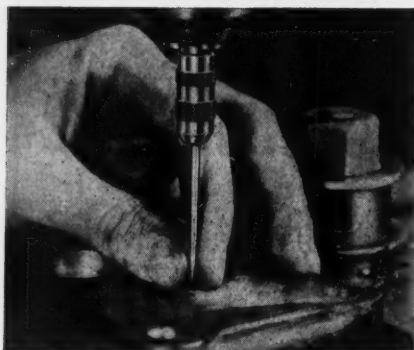
1. Positive Mechanical Feed.
2. Centralized Control.
3. Automatic Cross Feed Knock-Off.
4. Complete Dust Protection.
5. Cartridge Type Spindle Head.

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# REID BROTHERS CO., INC.

BEVERLY

MASS., U. S. A.



Starrett No. 828 "Wiggler" or Center Finder

firm contact with the work. The pointer can be telescoped into the body when not in use.

### Reid Improved No. 2 Automatic Feed Surface Grinder

The illustration shows the Reid No. 2 Automatic Feed Surface Grinding Ma-

chine which has been placed on the market by Reid Brothers Company Inc., Beverly, Mass. Centralized control, complete dust protection, and master craftsmanship are features of the machine.

The design of the machine includes a reciprocating table and a horizontal spindle, for which both mechanical and hand feeds are provided. The machine will grind work 18 in. long, 6 in. wide and 11 in. high, using a wheel 7 in. diameter. The work table has a working surface 18 x 6 in. and is provided with three 1/4-in. T-slots. The grinding head was designed to accommodate spindles of both cartridge and motor types. The spindle can easily be removed for adjustment or replacement. The spindle is of high grade, heat treated chrome molybdenum steel ground and lapped. The spindle runs in a phosphor bronze front box with adjustment for both wear and end play and is supported at the rear by a preloaded cylindrical roller bearing. Spindle speed, 2,500 r.p.m.

The longitudinal and transverse table feeds are automatic, the table operating at a speed of 20 ft. per minute. The standard spindle and table are driven

**Now!**

### Set Studs "THE ROLL GRIP WAY" with the TITAN Stud Setter

The TITAN drives or removes studs by gripping unthreaded body of stud and turning slightly to left or right. It drives studs having as little as 1/2" of gripping surface. Release is just a matter of reversal accomplished in a split second.

Used as a power tool, it may be driven by electric, air, or machine tool equipment. (Manufactured under the Kirkland Pat. No. 2069527.)



### RATCHET TYPE

For corners where interference prevents complete rotation of T Handle tool. Tool slipped over studs is ready to go. Right or left hand drive with ratchet control. The tool grip means a quick trip from stud to stud.

*Write for further details.*

**TITAN TOOL CO. Fairview, Pa.**

## LAPPED and POLISHED DIAMOND BORING and TURNING TOOLS



"V" Point



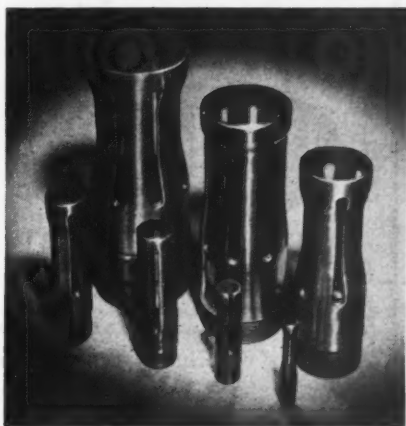
Offset

• For boring and turning all non-ferrous metals, bakelite, hard rubber, etc. Strong and keen cutting. Guaranteed to perform satisfactorily.

*Write for prices and recommendations.*

WHEEL TRUEING TOOL CO., Inc.  
13931 OAKLAND AVE. • DETROIT, MICH.

## A NEW Development



## Modern Pushers in *Bronze*

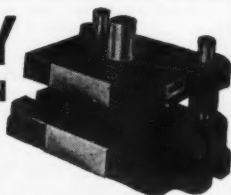
After many years of research, the Modern Collet and Machine Co. have found a bronze perfectly suited for use in the manufacture of Modern Pushers. It's a bronze that retains at all times the proper spring tension necessary for correct feeding. Being a friction-reducing metal, it is ideal for pushers used on work where scratching must be eliminated.

Every feature of the famous patented Modern Pusher is retained in the new bronze type. Only one pusher is needed for round and hexagon stock, and one is required for round and square stock-reducing tool inventory. They have a long, flat surface grip. They can be tightened, when they become loose through wear, to any desired tension without the aid of special tools.

See these New Bronze Pushers at Booth B-58 at the A.S.T.E. Show or write for full details.

**MODERN COLLET  
AND MACHINE CO.**  
401 Salliotte St. Ecorse, Mich.

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**Danly All-Steel Sets  
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8 Danly Warehouses Provide  
24-Hour Service for 85% of  
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SUPPLIES**

**They used to say  
'Strong as an Elephant'  
... but now they say,  
'It's Strong as**

**UNBRAKO**

**SOCKET SCREWS"**



Fig. 232  
"Unbrako"  
Hollow Set  
Screw.



Pats. Pend.  
Fig. 1434  
Knurled  
"Unbrako"  
Socket Head  
Cap Screw.

Because strength is a primary requisite in socket screws, we have steadily adapted the stronger, tougher alloys to our needs and have at the same time developed more improved methods of heat treating. All this assures "Unbrako" Products being tops in tensile strength and hardness. You just can't do better than specify "Unbrako" all the time. Send for Samples, Prices and Details.

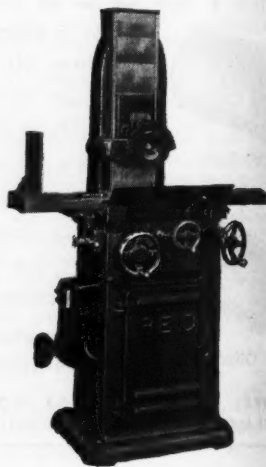
**STANDARD  
PRESSED STEEL CO.**

**JENKINTOWN, PENNA.**

Boston  
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by belt for which an automatic belt tightener is provided. Pulleys are equipped with ball bearings and all bearings are equipped with oilless bronze linings. For motor drive a 1½ h.p. motor is required, mounted inside the base. When a motorized spindle is used, the



Reid Improved No. 2 Automatic Feed  
Surface Grinder

power feed mechanism requires a ½ h.p. motor. Floor space required, 65 x 35 in. Weight, net, 1,250 pounds.

**Black & Decker 5/16-In. Universal  
Ball Bearing Drill**

The Black & Decker Manufacturing Company, 720 Pennsylvania Ave., Baltimore, Md., has added to its line a

**BEX LAYOUT STAIN**



5 oz. Can  
(Brush in lid)..... 50  
P. O. B. PITTSBURGH, PA.  
Write for Free Sample.

**NEW—BETTER**

Will not chip—Peel—No  
Dries instantly. Will not  
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acids. Simple, safe to use.

**BEX LAYOUT STAIN  
REMOVER**

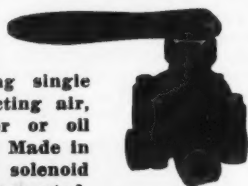
Instantly cleans off BEX Stain  
4 oz. Can..... 40  
P. O. B. PITTSBURGH, PA.

**BECK PRODUCTS COMPANY**  
315 BRIGHTON RD. • PITTSBURGH, PA.



Automatic bearings are equipped with all bearing bronzes built to 1/2 h.p. motor. The bearing is used, etc.

## 3 and 4-Way Control Valves



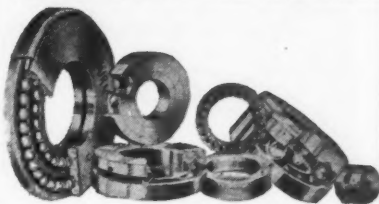
For operating single or double acting air, steam, water or oil cylinders. Made in lever, foot, solenoid and motor operated. All pressure up to 3000 lbs. Bulletins on request.

Other Products: Arbor Presses, Flexible Couplings, Steel and Stainless Ball Floats, Steam Traps and Separators, Air Separators, Traps and Vents, Etc.

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## AUBURN SPECIAL BALL BEARINGS



MADE TO ORDER

Auburn Special Ball Bearings are made to customer's dimensions or to answer specified service conditions. Send details of your problem and get the Auburn Answer.

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**AUBURN BALL BEARING CO.**

69 CLARISSA ST., ROCHESTER, N. Y.

Automatic Feed

Wires a 1/2 in. I, 65 x 35

In. Util  
kill  
manufact  
Ave., Th  
line a 1-

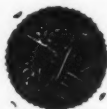
STAN  
BETTER

-Peel-  
Will not  
Material. Contain  
safe to use.  
OUT STAN  
OVER  
off NEW Job  
TSBURGH, PA.

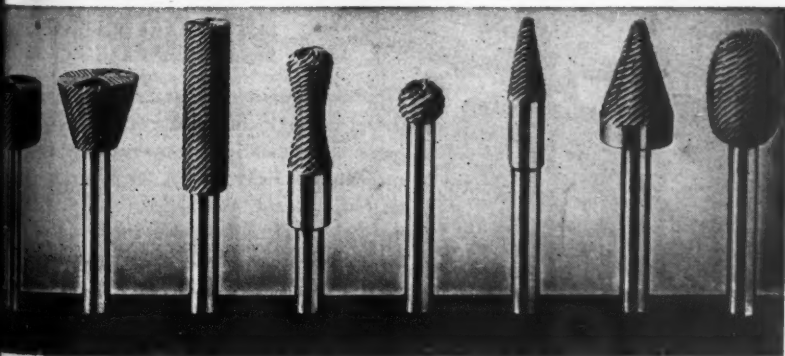
COMPAN  
Bever

March 1939

## FORD HAND CUT



## ROTARY FILES



Just a few of the many standard shapes which are carried in stock.

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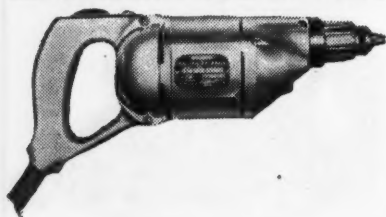
PERSHING AVE.

**M. A. FORD MFG. CO.**

DAVENPORT, IOWA

MODERN MACHINE SHOP 203

Utility Ball Bearing Drill. This drill is a general-purpose tool with the plus value of added chuck capacity frequent-



Black & Decker  $\frac{1}{8}$ -In. Utility Ball Bearing Drill

ly desired. It is particularly useful for general repair work in garages and service stations and for general maintenance work in industrial plants.

The  $\frac{1}{8}$ -in. Utility Drill has a no load speed of 1,100 r.p.m., correct for general service work and for drilling with carbon bits. Its drilling capacity is  $\frac{1}{8}$ -in. in steel, and  $\frac{3}{16}$  in. in hardwood. It carries splined gear mounting on the spindle, ball bearings throughout, and a universal motor of ample capacity for general

drilling, carbon cleaning, and other service work.

## Electronic Precision Switch

The illustration shows a precision switch of both novel and simple construction, now being produced by Electronic Products Mfg. Corp., 208 Washington St., Ann Arbor, Mich. The switch is housed in a bakelite-molded case and operates with an actual movement of 0.001 in. or less and with pressures of 7 oz. or more. The switch



Electronic Precision Switch

will handle unusually heavy currents up to 15 amperes A.C.

The switch is said to have very low



## ZEISS Indicating MICROMETERS

*Eliminate variation due to individual tools therefore give identical readings by different persons. Deviation conveniently read from indicator scale to .0001 in. No ratchet required. Sleeve graduations same as in plain micrometers. Adjustable limit marks permit tolerance to be easily kept. Setting can be sealed. Anvil and spindle faced with tungsten carbide lapped plane and parallel.*

*Catalog Fe 102 upon request.*

**CARL ZEISS, INC., 485 Fifth Ave., New York**

**728 So. Hill St., Los Angeles**

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Save many ways with STAR hack saw blades. They cut fast, stay sharp long, keep blade breakage down. The new metal boxes add convenience, protect blades, speed blade selection and identification.

The STAR "Moly" and Tungsten hand and power hack saw blades to cut costs.

**CLEMSON BROS., INC.**  
MIDDLETOWN, N. Y.

**STAR HACK SAW BLADES**  
TUNGSTEN AND POWER TUNGSTEN AND MOLY

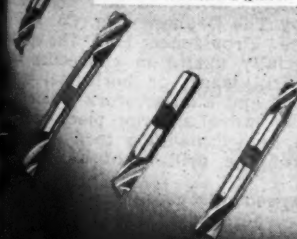
## SHEAR-CUT END MILLS

Have a complete line of  
**Single and Double  
End Mills.**

They save time and money.

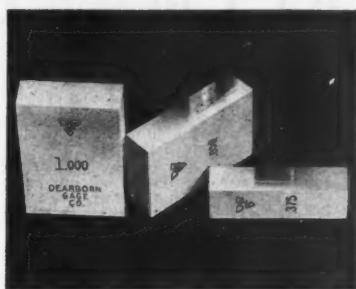
**Specify Progressive  
Shear-Cut End Mills.**

Write for catalog and price.



**PROGRESSIVE TOOL & CUTTER CO.**

12345 WOLCOTT ST. • FERRDALE, MICH.



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# Gage Blocks

### — OFFER —

#### • **Stability**

Properly seasoned steel remains stable with chromium plate.

#### • **Accuracy**

Our new and reclaimed CHROME PLATED Gage Blocks equal all accepted standards.

Where accuracy is indispensable, CHROME PLATED Gage Blocks are unparalleled

## DEARBORN GAGE CO.

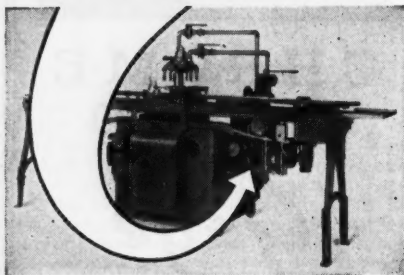
"Originators of Chromium Plated  
Gage Blocks"

22035 Beech Street  
DEARBORN - MICHIGAN

# PULLMORE CLUTCHES



Pullmore Clutches are made in single and double types for operation in oil or dry, in capacities from 1 h.p. to 75 h.p. at 500 r.p.m.



## Selected for the New Kiefer Filling Machine

Pullmore Clutches provide the smooth, dependable power transmission control required by high-production equipment. So a No. 2 Pullmore, of dry single-type, was specified for the new Kiefer Two-Stream Vario-Visco Filling Machine. The Pullmore Clutch gives instant power application and release without slip or jar. It's durable, easy to operate and adjust, compact, simple to incorporate in a machine. On either main or auxiliary drives it is unexcelled. Write for the Pullmore Blue Book.

## ROCKFORD DRILLING MACHINE DIVISION

of BORG-WARNER CORPORATION

300 Catherine Street

Rockford, Illinois, U. S. A.

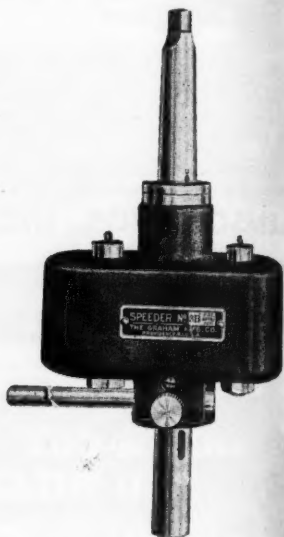
Sold by Morse Chain Co.,

Ithaca, N. Y. With offices in principal cities

contact travel with sufficient contact separation to actually break D.C. currents. It can be made with two different actuating pin positions, and with special characteristics to suit practically any requirement.

## Graham Drill Speeder

A high speed drilling attachment which the spindle speed of a drill can be increased by three times, especially designed for use on large, heavy



Graham Drill Speeder

work where one or two small holes have to be drilled in connection with a number of large holes, is now being marketed by The Graham Mfg. Co., 60 Weyland Ave., Providence, R. I. The speeder is especially useful in connection with radial drill work, or horizontal boring machines and similar work where it is costly to move a large piece of work from a heavy machine to a light drill press for the drilling of a few small holes.

The speeder is geared to multiply the spindle speed by three times. The shank, which is of tool steel with a hardened tip, drives a case hardened gear that meshes with gears which drive the auxiliary spindle at the increased speed. The auxiliary spindle

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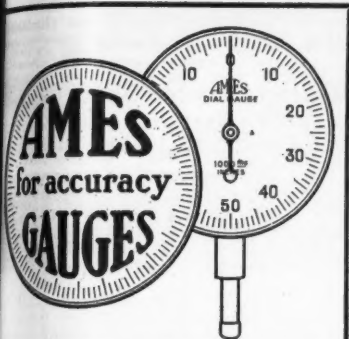


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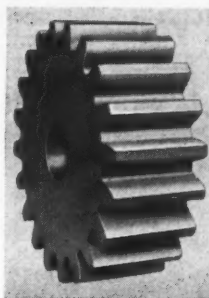
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AMES GAUGES during the past 40 years have been best in quality, accuracy, design and dollar value. Changes have been made constantly to improve them but never to cheapen for the maker's benefit. Present catalog shows a complete line of up-to-date models, incorporating all latest features, at prices often lower than elsewhere.

Send for copy.

**B. C. AMES CO.**  
 WALTHAM MASSACHUSETTS

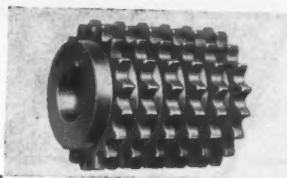


**CUT GEARS  
 AND  
 HIGH SPEED  
 ROLLER  
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 SPROCKETS**

**F. E. HOLTZ INC.**

2738 So. 29th St., Milwaukee, Wis.

WRITE  
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# WOOD & SPENCER TAPS

Standard and Special  
 Cut or Ground Thread

Carbon Steel  
 High Speed Steel

**THE WOOD & SPENCER COMPANY**  
 1910 E. 61ST ST.  
 CLEVELAND OHIO



March, 1939

MODERN MACHINE SHOP 207

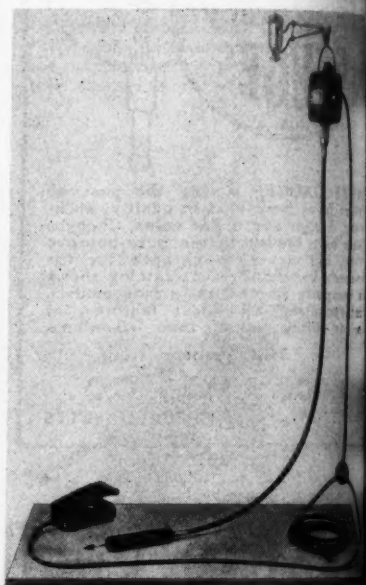
can be supplied either with a drill chuck attached to it or with a taper hole in it to accommodate taper shank drills.

The speeder is made in four sizes; No. 2 with a chuck for drills up to  $\frac{1}{8}$  in. and Morse No. 2 shank, No. 3 with chuck for drills up to  $\frac{1}{4}$  in. and Morse No. 3 shank, No. 3B with No. 1 Morse hole in spindle instead of chuck, No. 4 with chuck for drills up to  $\frac{3}{8}$  in. and Morse No. 4 shank, and No. 4B with No. 2 Morse hole in spindle. A ball thrust bearing directly between the bottom of the shank and the top of the

spindle takes the thrust and eliminates strain through the casing.

### Redcap Flexible Shaft Grinder

A flexible shaft tool which, in connection with the proper cutting tool



Redcap Flexible Shaft Grinder

can be used for grinding, drilling, reaming or sawing, is now being made by The Lea-Nard Company, 96 Warren St., New York, N. Y. The tool is designed to achieve a streamlined effect, high quality materials are used in its construction.

Machined Steel
Semi-Steel

**DROP FORGED STEEL**

Standardized Die Sets, embodying many exclusive features, a listing of more than 185,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New 288-Page Catalog

**E. A. BAUMBACH MFG. CO.**

1806 S. Kilbourne Ave. Chicago, Ill.

## NEEDLE POINT DIAMOND TOOLS



N-2

N-1

Indispensable in grinding taps, threads, gauges and for sharpening corners and contours on fine grain wheels.

SEND FOR SPECIAL CIRCULAR

**F. F. GILMORE & CO.**

112 Dartmouth St. Boston, Mass.

Complete line of  
Standard and Special Diamond Tools

**\$1.00**  
EACH

Discounts in  
quantities



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Grinder  
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cutting tool

**Here's PROOF**

MACHINED WITH  
KENNAMETAL



KENNAMETAL

MACHINED  
WITH HIGH  
SPEED STEEL

**THAT KENNAMETAL**  
*Provides a SMOOTHER FINISH*

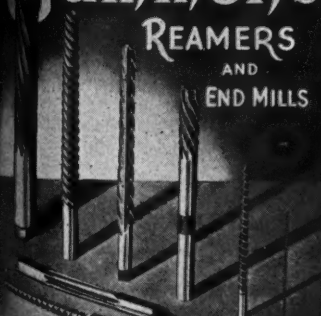
Compare the stock machined with KENNAMETAL (above left) with that machined with high speed steel (above right). The fine quality of work produced economically by KENNAMETAL-tipped tools explains the steady stream of repeat orders for this intermetallic compound. KENNAMETAL will machine steel heat-treated up to 500 Brinell, while combining roughing and finishing in one operation, and it has properties which make it readily adaptable for machining softer metals as well. Available in 18 standard tool styles (Style 11 illustrated above) or you can easily braze your own tools using KENNAMETAL blanks. No. 2 catalog gives detailed instructions.

**McKENNA METALS Co.**

300 LLOYD AVENUE

LATROBE, PENNSYLVANIA, U.S.A.

**Gammons**  
**REAMERS**  
AND  
**END MILLS**



INDICATORS of the  
Special Taper Pin Reamer  
Special Reaming Problems limited  
Immediate Shipment on Stock

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**SPIRAL SPECIALISTS**

THE GAMMONS-HOLMAN CO. MANCHESTER, CONN.

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**DLS**

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arch, 1930 March, 1939



## The New Boyar-Schultz HEAVY DUTY Profile Grinder No. 2

SEE IT AT THE DETROIT  
A. S. T. E. SHOW

A New and heavier Profile Grinder built to handle Tool and Die work of the larger and more difficult types.

It is designed to do rapid and exacting work on profiles, contours and uneven surfaces that under ordinary methods consume many costly hours.

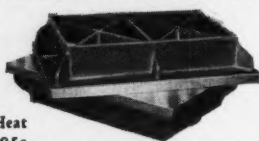
The Boyar-Schultz Heavy Duty Profile Grinder No. 2 is a PRECISION MACHINE TOOL in every sense and smooth running. All controls and adjustments are operated conveniently from the front. Powered by a 2 H.P. G.-E. Ball-Bearing Motor, the spindle turns at approximately 10,000 R. P. M. with vertical oscillations of 100 per minute. It is a rapid stock remover, even with small diameter wheels.

Write for descriptive circular.

**Boyar-Schultz Corporation**  
2120 Walnut Street • Chicago, Ill.

## SURFACE and BENCH PLATES

11" x 15"  
12" x 18"  
18" x 24"  
24" x 24"  
24" x 36"



Properly Heat  
Treated, Thoroughly Seasoned. Write for Complete Price List.

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4 MAIN ST. • BELLEVILLE, N. J.

## New Nesting Type Tote Pans



Lots of 50  
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20" long x 12" wide x 6½" deep.  
16 ga., drag holes and handles both ends.

Lots of 100 & 200 less 3%; 300 up less 5%

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## G E A R S

**Good Gears Only**

**All Kinds**

**Any Quantity**

**AT THE RIGHT PRICE**

**THE CINCINNATI GEAR CO.**  
1825 Reading Road Cincinnati, Ohio

struction, and it is said to be built to meet the demands of precision workmanship.

Laminated linen base bakelite is used in the construction of the handpiece, reducing the noise level to the minimum and enabling the handpiece to run cool under continuous duty. The tool is powered by a ½ h.p. universal type motor, finished in black crinkle, complete with rubber-covered cord and plug and variable speed foot rheostat. The flexible shaft is 37 in. from motor to handpiece. The handpiece, which is ball bearing, is equipped with a No. 6 balanced Jacobs chuck. Maximum speed of handpiece, 12,500 r.p.m. Net weight with rheostat, 8 lbs. Shipping weight, 11 pounds.

## Tannewitz Model 24M Di-Saw

The Tannewitz Model 24M Di-Saw for continuous sawing and filing illustrated herewith is a simplified die sawing machine manufactured by The Tannewitz Works, Grand Rapids, Mich. The machine is applicable to many industries where it is necessary to perform a variety of intricate inside or outside sawing and filing of shapes, contours, and so on, in ferrous and non-ferrous metals, including tool steels and chrome metals.

The machine is of welded steel construction incorporating a variable speed mechanism, which is operated by a handwheel located at the left front of the machine. A wide range of speeds in feet per minute can be obtained almost instantly by revolving the handwheel. The exact speed in feet is registered on a tachometer. A two-speed drive motor is included in the variable speed mechanism to minimize wear on the V-belts.

A mechanism is provided for feeding the work into the saw. It can be adjusted.

## HINGES

**VARIOUS WIDTHS  
and GAUGES**



**BUTTS AND  
CONTINUOUS LENGTHS**

**WRITE FOR PRICES**

**S & S MACHINE WORKS**

4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

For  
**GUARDS  
CABINETS  
CASES  
BOXES**



SOCKET HEAD CAP SCREWS SAFETY HOLLOW SET SCREWS

**MADE OF ALLOY STEEL  
MILLED FROM BAR**

*Try Them On Your Next Job!  
Or Write For Samples Today.*

**ECONOMY  
MACHINE PRODUCTS  
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## A DIAMOND DRESSER THAT STANDS ABUSE

Carboly Dressers stand abuse because they don't depend on one diamond. Instead, they have a multitude of sharp, diamond cutting points permanently held in a special matrix. To get a new cutting surface just give the dresser a quarter turn in its holder. No remountings! No worries! Lower cost! Send for catalog DR-38.

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Catalog  
DR-38

• **CARBOLOY** •

DIAMOND IMPREGNATED WHEEL DRESSERS

for **IMMEDIATE**  
SHIPMENT FROM SIX WAREHOUSES

● Reduce your tool and die costs with HY-TEN "M" TEMPER .70 CARBON CR-NI-MOLY oil hardening alloy steel.

Extreme toughness at high degrees of hardness. Rounds, squares and flats in stock. Forgings of all types.

**SEND FOR DESCRIPTIVE FOLDER**

ALLOY



STEELS  
ALLOY

**S. A. E.**

STEELS

**Wheelock, Lovejoy & Co., Inc.**  
130 SIDNEY ST., CAMBRIDGE, MASS.  
Cleveland • Chicago • Newark  
Buffalo • Detroit

justed for the amount of pressure to be exerted by means of a handwheel located on the right front of the machine. Standard equipment also includes a screw type feeding mechanism by means of which the operator can exert as much pressure as desired. The screw has a pivoted half-nut construction so that the nut can be released and the screw set up at any distance instantly, whereupon the nut can again be set, engaged with screw threads, ready for use. Chain files of exceptionally long length and various sizes and shapes can be used for both inside and outside work.

### GRAY TURRET HEAD METAL CUTTER OR NIBBLER

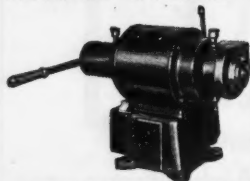


Cuts all metals any shape—  
30 gauge up to 1".

GRAY, Originator of  
First Practical Metal  
Cutter or Nibbler.  
GRAY Cutters Still  
Lead.

**GRAY MACHINE CO.**  
Dept. A., P. O. Box 596,  
Philadelphia, Pa.

### IDEAL SPEED LATHES



FOR LAPPING  
FINISHING  
POLISHING  
SMALL PARTS

2 Speed Motor.  
Automatic Brake  
Collet or 3 Jaw  
Chucks. Hand  
operated or auto-  
matic. Write for  
Circular 380.

**SCHAUER MACHINE CO.**

2060 READING ROAD • CINCINNATI, OHIO

A conventional type butt welder which has a capacity for butt welding blades up to  $\frac{1}{2}$  in. wide is standard equipment. When the operator wishes



Tannewitz Model 24M Di-Saw

to saw inside contours, the saw blade is cut in two, slipped through the hole welded, the weld flash ground off, and slipped back over the drive wheels.

Other features such as the light over the welder and the work light, together with an efficient blower tube for blowing away the chips and a square type magnifying glass for easy following of

### ... for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

Write today for data  
and prices.

**HJORTH LATHE & TOOL CO., 12 BEACON ST., WOBURN, MASS.**

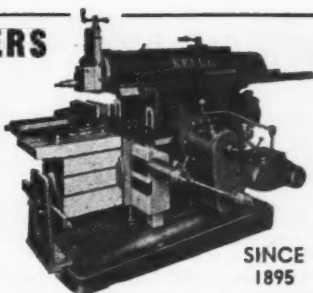


## CRANK SHAPERS HEAVY DUTY

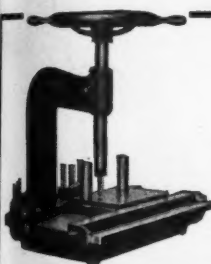
Made in six sizes from 16" to 36" stroke, with motor or single pulley drive. Timken Bearings throughout. Revolving Table. Semi-automatic pressure lubrication. Centralized control. Stroke and feed adjustment during operation. Thoroughly guarded to protect operator and machine. Attractive prices.

ONE-YEAR GUARANTEE.

General Engineering & Mfg. Co.  
ST. LOUIS MISSOURI



SINCE  
1895



## TOOL ROOM TAPPER

**Saves Time . . . Taps . . . Trouble**

The Master Tapper cuts direct labor of hand tapping by requiring one-fifth the time.

Eliminates tap breakage. Uses high speed ground thread taps at lower cost than carbon taps.

Capacity— $\frac{1}{8}$ " N.C. and N.F. Working surface 14" x 20".

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**THE MASTER TAPPER CO.**  
4 Main Street • Belleville, N. J.

## NEW BERGRAM Tool Grinder

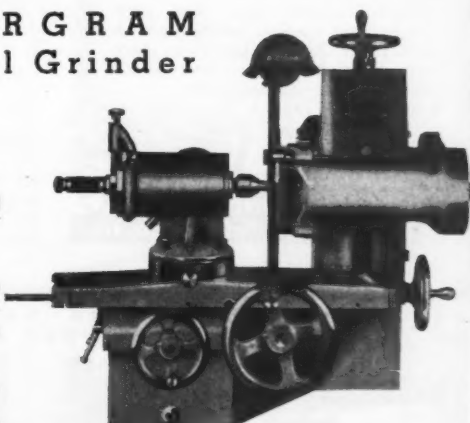
Accurately Grinds . . .

1. Spiral End-mills
2. Small Cutters
3. Reamers—straight and tapered
4. Taps—both lands and flutes
5. Formed Tools

Instant Set-up. Will handle tools from 1/16" to 3" diameter and up to 6" in length of flute.

You will want one in your shop.

Write now for illustrated folder.



**BERGRAM MECHANICAL ENGINEERING CO.**

18 HARTFORD AVE.

NEW BRITAIN, CONN.

## RED CAP FLEXIBLE SHAFT GRINDER

Cool, Comfortable Bakelite Handpiece

DRILLS, GRINDS  
ROUTS, SAWS

Maximum

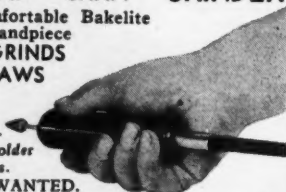
Speed

12,500 r.p.m.

Write for Folder  
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AGENTS WANTED.

THE LEA-NARD CO., 96 Warren St., N. Y.



the scribed line, are said to be invaluable to the operator. These items are standard equipment.

## Logan Model MC Heavy Duty Mill Type Cylinder

Logansport Machine, Incorporated, Logansport, Ind., has brought out a non-rotating double-acting all-steel



Logan Model MC Heavy Duty Mill Type Cylinder

cylinder which is designed for extremely severe service. The cylinder is made in six models, each of which is furnished with standard size piston rod or with 2-1 piston rod differential. Steel flanges are electrically welded to

# ACME

*Standardized*

## JIG BUSHINGS



Acme Standard  
over 6700 Items  
ASA Standard  
over 4200 Items



Acme Drill Jig Bushings are made by the most exacting, scientific methods—insuring long wear, accurate fit, and absolute satisfaction. A standardized product, carried in stock for prompt delivery in over 10,900 standard items—all completely finished and ready for use. Special sizes made to order.

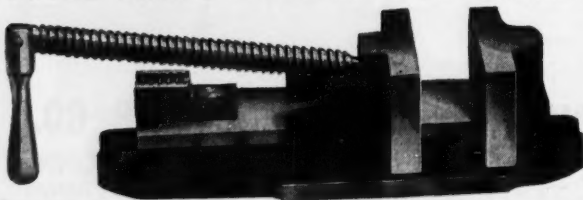
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SAVE OPERATING TIME ON YOUR  
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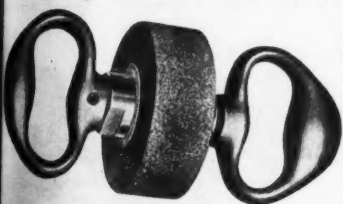


Instantly adjustable to any position. Locks and unlocks with a half turn. Positive grip. Ideal for making into a special jig. Write for bulletin 22-3.

CARDINAL MACHINE CO.  
109 S. Jackson St.  
Glendale • California



## The Desmond CRACKER JACK Grinding Wheel Dresser



The 4" dia. wheel is mounted on dust protected ball bearings with safety type handles.

It will quickly dress a square edge or bevel on your grinding wheel.

**The Desmond-Stephan Mfg. Co.**  
URBANA, OHIO

Canadian D-S. Co., Hamilton, Ontario

## Gear Specialties



14  
to  
96  
D.P.  
14  
to  
96  
D.P.

—IN THE SMALL RANGE—Spurs, Spirals,  
Worms, Worm Gearing, Racks, Ratchets, etc.  
High precision or commercial production.  
Made to order ONLY—No Stock—No Catalog.

## Gear Specialties

INCORPORATED  
CHICAGO

30 W. Medill Ave. Phone - Humboldt 3482

## NEW DEVELOPMENT

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## EVANS REAMERS

**SURPASS ALL.  
HIGH SPEED STEEL.**

**No Honing.  
Chrome Like Finish.**

50 to 80 thousandths expansion.  
Full Bearing Surface.  
Perfect Alignment.  
Will not chatter.  
With Left and Right Spirals.  
It cannot fall in slots or oil  
grooves. Extension Pilots for  
Line-up Work.

## UNIVERSAL REAMER DRIVE

**FOR REAMING HEAVY JOBS  
ANYWHERE IN THE SHOP**

The machine is  
brought easily to  
the work on large  
ball bearing cas-  
ters.  
The height of the  
reamer is adjust-  
able to suit the  
work.



For reaming  
jobs that can  
be held in the  
hands, the  
machine is set  
to bench  
height, and  
the Universal  
Extension removed.

**WRITE FOR CIRCULAR**

**Evans Flexible Reamer Corp.**  
3656 LINCOLN AVE., CHICAGO, ILL.



less steel tubing which is properly finished inside to ensure long service. The heavy duty steel end covers are bolted to these flanges with through bolts, making for easy assembly. The construction throughout, including an extra strong leak-proof piston, is designed to give continuous trouble-free service under severe operating conditions. This line of cylinders is especially recommended for use in steel mills, foundries, road-building machinery, and other industries using heavy duty equipment.

The Model MC Cylinder is made with 11 different sizes of bores from 3 to 20-



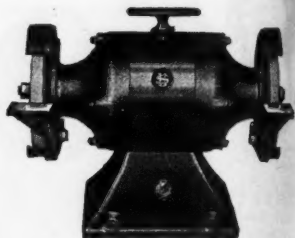
**LeMaire Hydraulic Feed Control Cylinders and Plain Cylinders for All Types and Sizes. Write**

**LeMaire Tool & Manufacturing Co.**  
Dearborn, Michigan

in. diameter and with cylinder length of 3 3/8 to 5 inches.

## U. S. "Skipper" 6-In. Bench Grinder

The "Skipper" 6-In. Bench Grinder built by The United States Electric



U. S. "Skipper" 6-In. Bench Grinder

Tool Co., Cincinnati, Ohio, has been designed to increase its efficiency. The motor, which is of the capacitor type and totally enclosed, has no commutator, brushes or centrifugal switches and



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Made of  
Stainless Steel

Write for catalog AC showing complete line of calipers, depth gages, height gages, projectors, etc.

Highest Precision  
1/10000

**PARK SALES CO., 3 Park Pl., New York City**

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The files with the WAVE CUT. For better and faster work.

Chip Breakers arranged wave like, no clogging, chips curl between teeth and are thrown out sideways by succeeding chips. Smooth and uniform surfaces.

**For  
Economy  
Performance, Efficiency**

A Comet Milled File outlasts any ordinary File at least five times.

**COMET TOOLS, INC., 39 Union Sq., New York, N. Y.**

The ideal files for all industries. Write for Catalog. Agents and Dealers wanted.

## 40 Types of Meylan Stop Watches

**A WATCH FOR EVERY PURPOSE**

Ask for FREE folder No. 3S fully illustrating and describing some 40 types of stop watches. No salesmen will call.

**A. R. & J. E. Meylan**

"Specialists in timing instruments"

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## CENTERLESS GRINDING

*Accuracy—Prompt Service*

**Commercial Centerless Grinding Co.**

6538 Carnegie Ave., Cleveland

## WISE

With and Without Jig Attachments

For Drill Press

Often used on Miller, Shaper or Planer.

6", 8", 12" Jaws

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## KNURL HOLDER

For Turret Lathes

Operates like Screw Die.

Adjustable to any size within its capacity.

Straight Cut Knurls in Swivel Lugs Produce Standard Knurling.

Shank made to suit turret

**THE GRAHAM MFG. CO.**  
60 Willard Ave. PROVIDENCE, R. I.

# ZIEGLER

ROLLER DRIVE

## Floating Holder

FOR

**TAPS — REAMERS**



Compensates for spindle misalignment, eliminating over-sized or bell-mouthed holes.

Another advancement toward accuracy in tapping and reaming by the originators of Roller Drive Radially Floating Tool Holders!

Also made with straight or special shanks.

See one at Booth C-1 in Detroit's SAE Tool Show

*Descriptive literature on request*

**W. M. ZIEGLER TOOL CO.**  
1926 TWELFTH ST. • DETROIT

will stand repeated overloading without burning out. The rotor is dynamically balanced to eliminate vibration. Tool rests are adjustable for wheel wear. The new "Skipper" is  $\frac{1}{4}$  h.p., 3,400 r.p.m., and weighs 45 lbs. It comes equipped with rubber-covered cable and plug, carrying handle, wheel guards, tool rests, toggle switch mounted in base, and one fine and one coarse grinding wheel.

### C-P Electric Screw Driver

Among the special tools that have been developed by Chicago Pneumatic Tool Company, 6 East 44th St., New York, N. Y., for use in the building of airplanes is the electric screw driver shown in the illustration. The screw driver is made in eight sizes, four to take No. 8 wood or  $\frac{3}{16}$ -in. machine screws and four to take No. 12 wood or  $\frac{1}{4}$ -in. machine screws. Net weights vary from 5 lbs. for the smallest to 6 $\frac{1}{2}$  lbs. for the largest and the overall length ranges from 10 $\frac{1}{4}$  to 14 $\frac{1}{4}$  in. Standard equipment on the smaller sizes includes a three-conductor cable and plug and one screw driver bit with

finder. A screw driver bit and finder with  $\frac{1}{4}$ -in., 24-thread can be furnished if so specified.

On the larger sizes a non-rotating



C-P Electric Screw Driver

bell-mouth finder can be supplied in place of the quick change chuck if requested. On six of the eight sizes mentioned, a reversing switch can be supplied extra. All of the screw drivers are wound for 110 or 220 volts, but can be furnished for 32 or 250 volts on special order.

## FIRST WITH 2 SPEEDS

### CLEMENTS-CADILLAC Portable Electric BLOWER and SUCTION CLEANER

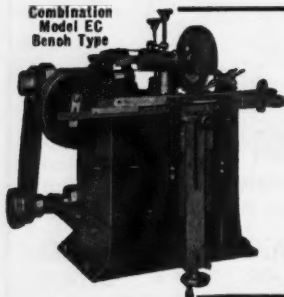
It's new... it's practical... it's more efficient... it saves time and money! And, because of its high and low speeds, it ably performs the work, and saves the cost of two blowers. Write for details.

**CLEMENTS MFG. CO.**  
6655 So. Narragansett Ave.  
CHICAGO • ILLINOIS



1 H.P.  
(Type)

Combination  
Model EC  
Bench Type



## SHARPEN YOUR OWN SAWS

### SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS

The **WARDWELL SAV-A-SAW** automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information

**THE WARDWELL MFG. CO.**

3166 FULTON RD.

CLEVELAND, OHIO

bit and end  
be furnish  
non-rotat



Driver  
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but can be  
ts on spec



1 H.P.  
(Type)

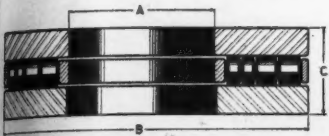
SAWS  
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AWS

arpens are  
p to 75 per  
or the ma  
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CO.  
ID, OHIO

March, 1939

# GWILLIAM



TYPE RT

## ROLLER THRUST BEARINGS

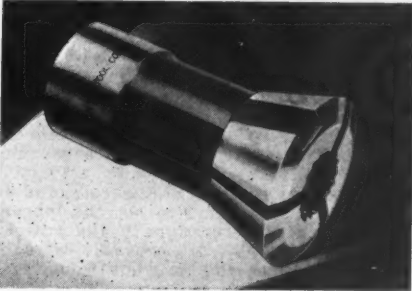
Made with flat seats and in a variety of self-aligning types. These bearings are especially adapted for heavy loads at slow or moderate speeds.

Standard sizes are shown in our general catalog, sent upon request.

**THE GWILLIAM CO.**  
338 FURMAN ST., BROOKLYN, N. Y.



## Spotlighted By a **SURER GRIP**



## Sutton DIAMOND-GRIP Collets

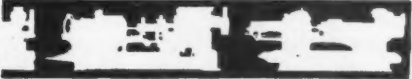
ON the job the spotlight of improved screw machine production shows the advantages of Sutton DIAMOND-GRIP Collets. Their clean-cut diamond serrations grip tighter under less tension, reduce spoilage, and clear themselves of dirt and chips... Single-piece, master, and compensating master styles listed for all machines in Sutton Catalog. Send for a copy.

*SPOTLIGHTED at Detroit ASTE Show, March 14 to 18—A complete display of Sutton Collets, Feed Fingers, and other screw machine accessories*

## Sutton Tool Company

2842 W. Grand Blvd., Detroit, Mich.

Represented in Canada by  
**HI-SPEED TOOLS, Ltd., Galt, Ont.**



## Accessories for Screw Machines

**Bond**  
STOCK

# GEARS

SPROCKETS

**SPEED  
REDUCERS**

**FLEXIBLE  
COUPLINGS**



For Quick  
Replacement

For NEW  
Machinery

Unusually Complete  
Range of Sizes  
and Types

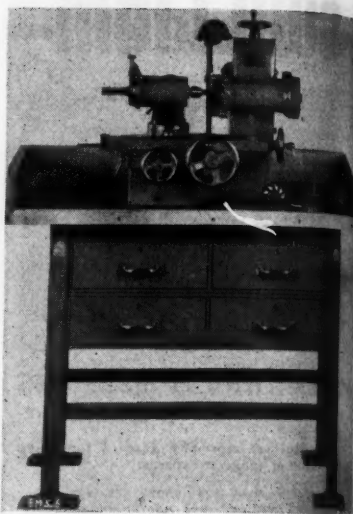
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CHARLES  
**Bond**  
COMPANY  
1234 ARCH STREET PHILADELPHIA, PA.

## Bergram Tool Grinder

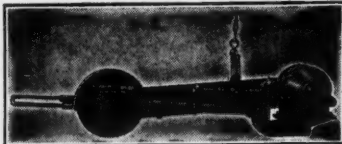
Presented herewith is a tool grinder which has been brought out by Bergram Mechanical Engineering Co., New Britain, Conn., for the grinding of spiral end mills, small cutters, reamers either straight or tapered, taps (both lands and flutes), and formed tools. The machine is precision built of selected materials and is designed for long life under normal and constant use.

The mechanism is mounted on a welded steel column and base in a single unit, providing a substantial and rigid frame. The grinding wheel is mounted vertically on the face of the column and is provided with a hand-wheel for adjustment. The wheel spindle head may be swiveled to set the wheel normal to the helix angle of the cutter being sharpened, to provide correct clearance angle and to allow grinding to an extremely sharp edge. The wheel spindle is mounted on precision ball bearings and is driven by a constant speed motor through a flat endless belt. The motor is cradled on the rear of the column and is adjustable to control belt tension, thus eliminating any contribution to spindle vibration. The spindle, housing, and base are of generous proportions to provide for perfect balance. The workhead is mounted on a swivel bracket by which means it may be tilted



Bergram Tool Grinder Mounted on Bench  
portions to provide for perfect balance.  
The workhead is mounted on a swivel bracket by which means it may be tilted

### MUMMERT - DIXON SWING FRAME GRINDERS



Sizes 14" 16" 18" 20" and 24" wheels.

ASK FOR DESCRIPTIVE CIRCULAR

MUMMERT - DIXON CO.

120 Philadelphia St. • Hanover, Pa.

## CAMS

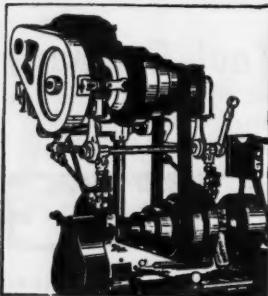
All sizes — shapes

Precision work on  
special machines,  
parts, jigs, tools, etc.

VARICK MACHINE & TOOL WORKS, INC.

306 HUDSON ST.

NEW YORK



## Built like a bridge—

This Remco Motor Drive is rigid. Compare its three point suspension with the usual one or two point. Note its bridge-like truss construction. Vibrationless. Accurate. No overhang. No strain on tool. Simple installation. Low price. Investigate—write! Remco Products Corp., State and Hay Sts., York, Pa.

## REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



## WALES HOLE - PUNCHING and NOTCHING DIES

SPEED

ECONOMY

FLEXIBILITY

NEVER OBSOLETE

FOR FLAT SHEETS UP TO 14 GAUGE

Write for Bulletin A

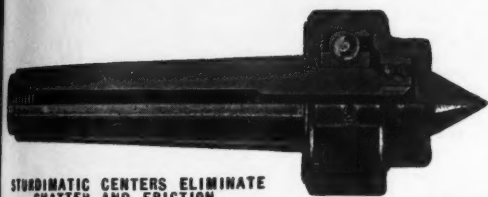
**THE STRIPPIT CORPORATION**

1859 NIAGARA STREET

BUFFALO, N. Y.



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STURDIMATIC CENTERS ELIMINATE  
CHATTER AND FRICTION

8 years continuous use has  
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Sturdy radial and thrust bear-  
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## ARTER MODEL A

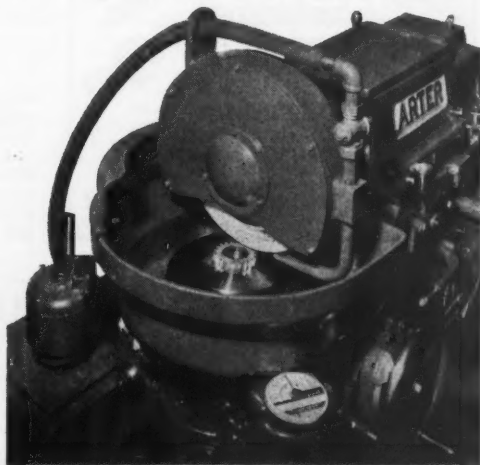
## Rotary Surface Grinders

SIZES - 8" - 12" - 16"

Model A-1 — 8" grinding  
angular face of a "Fel-  
lows" gear shaper cutter.  
Table tilt of 5° positively  
positioned by taper pin.

This is but one of the many  
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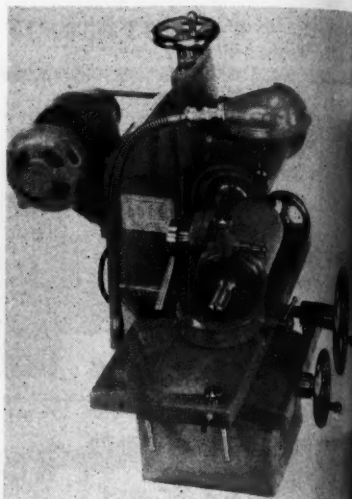


**ARTER GRINDING MACHINE CO.** Worcester,  
MASS.

vertically or swiveled horizontally. The workhead bracket is mounted on a horizontally swiveling unit with a spring latch at zero position, facilitating rapid release and return to zero. The workhead is also mounted on selected precision bearings and provides the essential conditions of a free-turning spindle without backlash. An indexing dial and clamp facilitates setting up the cutter and holds the cutter indexed while end teeth are being ground. A knurled handle and draw bar hold the work spindle in place and permit easy turning of the cutter to follow a helix angle.

The table is mounted on the saddle and provided with a rack and pinion for fast travel and handwheel for slow travel. A diamond, mounted in a special holder, can be mounted in the work spindle so that dressing operations can be performed as in grinding.

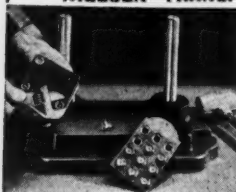
The grinding spindle has a vertical



Bergram Tool Grinder

adjustment of 5 in. and the workhead adjustment, by rack and pinion feed, 6 in. Cross travel is  $1\frac{1}{4}$  in. Cutter head can be tilted 20 deg. in either direction. Wheel spindle speed, 5,200 r.p.m. Floor space required,  $43\frac{1}{2} \times 43$  in. Weight with regular equipment, including bench, 355 pounds.

**Accurate Hole Transfer Made Easy With  
NIELSEN TRANSFER SCREWS**



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods.

7 Sizes U. S. S.—Inexpensive — Last for years.

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**CENTERLESS GRINDING**

STRAIGHT - CYLINDRICAL  
SHOULDER—PROFILE  
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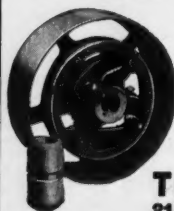
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**"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES  
EXPANDING "TYPE B"**



Especially adapted for Countershafts, Line-shafts and many other moderate speed drives. Few working parts and rugged build account for its superior service.

Complete line of pulleys, countershafts, extended sleeve and cut-off couplings are listed in Circular B-4. Send for it.

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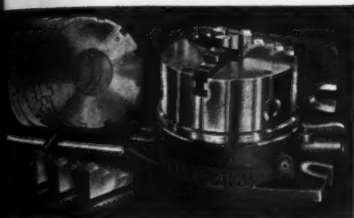
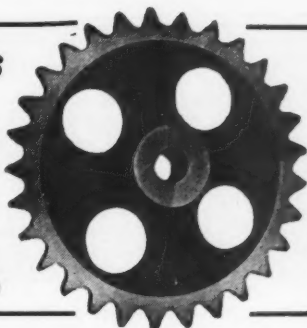
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**ADAPTABLE** for milling, drilling, slotting or planing.

**FOOLPROOF**—mask plates prevent errors.

**RAPID INDEXING**—release clamp, withdraw index plunger, revolve turret.

**RIGID—ACCURATE—QUICKLY SET UP.**

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## SHELDON Back Geared Screw Cutting PRECISION LATHES

### MORE LATHE FOR THE MONEY!

In standard 10", 11", 12" back geared screw cutting precision lathes SHELDON distinctly gives more lathe for the money—more quality, more features, more weight, more value. From the complete line of attachments, accessories, and drives you can get in a SHELDON exactly the lathe you need at a surprisingly low cost. Make it a rule to see the SHELDON before you buy.

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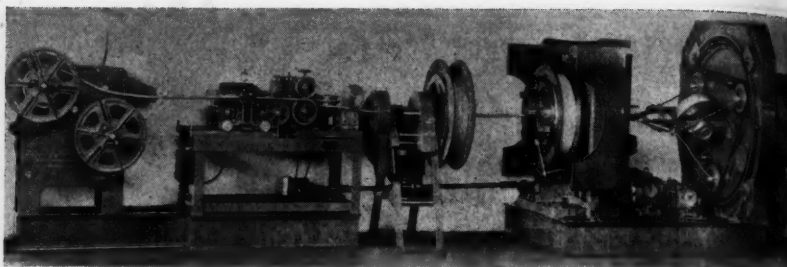


No. 1020 BMW  
(as illustrated) **\$185** F.O.B.

Factory

**SHELDON MACHINE CO., Inc.**  
1626 North Kilbourn Ave.  
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Hardened and ground spindle with Oversize Bronze Bearings • Worm Feed Apron with Power Cross Feed • Semi-Quick Change Gear Box — $\frac{3}{4}$ " Collet Capacity • Hand Scraped Ways—2 "V"-ways, 2 Flat Ways • Overhead Motor Drive Attachment (Motor Extra).



Sleeper & Hartley Combination Cable Armoring Machine.

## Sleeper & Hartley Combination Cable Armoring Machine

Sleeper & Hartley, Inc., Worcester, Mass., has brought out a cable armoring machine comprising a combination of five separate units. The strander or take-off consists of a rotating head carrying either two or three trunions upon each of which is suspended a 30-in. spool of insulated conductor wire. As the head rotates, the several wires are twisted together with the spools remaining in a normally horizontal plane. Wire

tension is controlled by a friction device.

As the twisted wires proceed through the head, they enter a wrapping device in which they are wrapped with a continuous strip of paper. The twisted and wrapped wires then pass through an armoring head, which coils around them a galvanized steel strip. The strip stock is supplied from a split spool which may be removed from the head when empty without the necessity of cutting. The wire next passes to the spooler in which the desired width of strip stock is properly laid. Full spools are shifted from

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HIGH-SPEED  
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**3-IN-ONE-OIL**

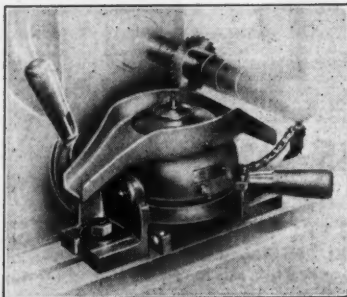
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**DRILL THESE HOLES**

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Your business letterhead will bring literature.  
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**Mill Over 1,000 Parts Per Hour  
WITH THE**

**NEW Dearborn Automatic Chucking  
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Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positioning accurate in operation.

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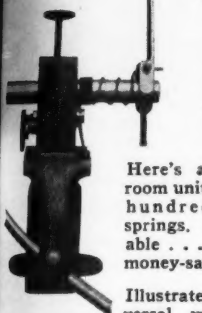
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### Universal Hand SPRING WINDER



Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable . . . a real time and money-saver.

Illustrated is No. 3 Universal with adjusting shaft of  $\frac{1}{2}$ " square. Takes wire up to  $\frac{1}{8}$ " diam. or No. 8 gauge.

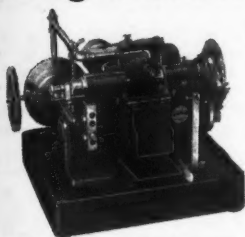
Desirable territories open to representatives.

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## "Waltham" Pinion Cutting Machines



### FAST AND ACCURATE

Operator can attend to several machines. For small pinions, a magazine feed not shown in the cut allows the machine to run without stopping, materially increasing the production. One, two, or three cuts, according to the nature of the work, may be made.

**Waltham Machine Works**  
WALTHAM MASS.

## GROUND To Give Keenness

these Midget Cutters often give 7 to 10 times the increase in production per dollar of tool cost.

And what's more --- **Severance** guarantees that they will give from 3 to 5 TIMES more production per tool — and keep on doing it every time they are re-ground.



**So!**  
**Cut Your**

Rotary Filing costs like one \*Chief Executive who writes, "It will cut our tool costs at least three-quarters."

Meet us at the Tool Show and see some of the many Special Midget Cutters as well as Chatterless Countersinks and Spot-facing Cutters, Cutters for burring inside and outside of tubing in one operation --- the smallest tube burring cutter we have yet made may be seen in actual production at our Booth A-88.

\* Name on request.

**Severance Tool Mfg. Co.**

1516 E. Genesee Ave., Saginaw, Mich.

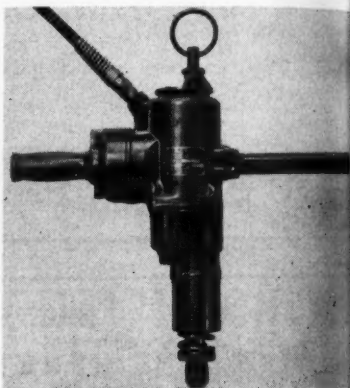
the spooler to the armoring head by means of overhead lift or conveyor.

The finished cable then passes to the measuring and cut-off unit, which is arranged so that as the finished cable rides over the surface, it operates a trip cam connected to the cutting device and thus the cable is cut in 100, 150, 200 or 250-ft. lengths as required. The length of cutting is controlled by change gears. The cutting saw operates automatically while the armoring machine is in operation. The take-up, which is a two-spin-

dle unit, is equipped with 20 x 6 x 10 in. barrel collapsible spools with removable front flanges, and each spindle is equipped with an individual clutch for independent operation. A friction device assures constant speed of the take-up and a cam-operated traverse device with change gears is provided to cover complete range of cable diameters. The machine is approximately 24 ft. long.

## Rotor High Cycle Tools

The Rotor Tool Company, Cleveland, Ohio, announces a complete line of high cycle electric drills, screw drivers, and nut setters ranging in capacity from 1/8 to 1/2 in. These tools will be exhibited



Rotor 680 N Side Handle Type Nut Setter with Double Adjustable Impact Clutch, 850 R.P.M., 1/2-In. Capacity

for the first time at the A. S. T. E. exhibition in Detroit in March. A number

## ROTARY TABLE



High Grade.  
Low Price.

Now made in four sizes and six models.

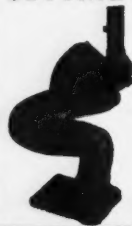
Plain rotary milling tables and combination tables with dividing plates. Ask your dealer or write us for complete catalog.

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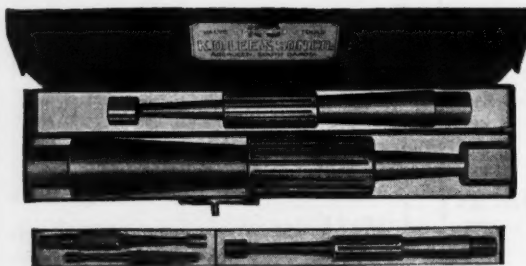


BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16 1/2 lbs.; cuts up to 14 gauge. No. 2, weighs 32 lbs.; cuts up to 10 gauge. No. 3 weighs 65 lbs.; cuts up to 3/16 gauge. Write for circulars and prices.

**BEVERLY Throatless Shear Co.**

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Chicago Illinois

## **KNOCK-OUT** 3/8" to 2 1/2" **MANDRELS** **KNOCK-OUT**



### IN ONE SMALL BOX

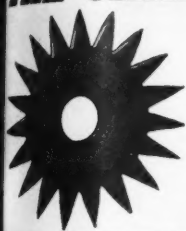
A set of Knock-Out expanding Mandrels will quickly pay for themselves by saving time and expense making special arbors for each job. Made of tempered steel, accurate within .001".

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Leaders in  
quality  
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winners  
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Toolholders, Expanding Mandrels,  
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The Western Tool & Manufacturing Co. Springfield OHIO

HEAVY  DUTY

## Continuous Hinge No. 290



A Heavy Hinge  
For Heavy Duty  
Stocked in 7 foot  
lengths, 3" and 5"  
when wide open.  
Special lengths and  
widths to order.  
For details write:  
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HINGE DIV.  
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CHICAGO**

## Drill, Cutter, Tool and Die Costs

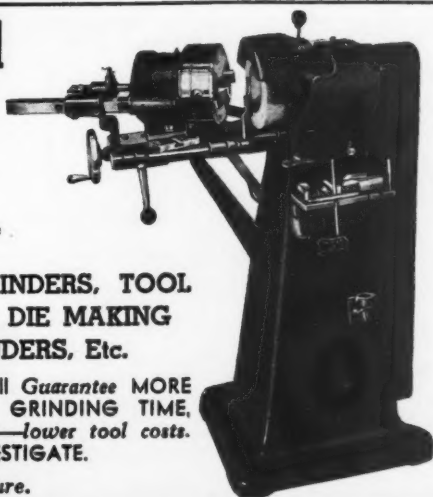
*can be materially  
reduced*

by the introduction and use of more  
efficient reconditioning methods.

OLIVER TWIST DRILL GRINDERS, TOOL  
AND CUTTER GRINDERS, DIE MAKING  
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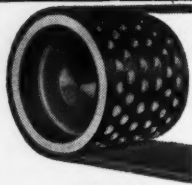
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PRODUCTION PER TOOL, LESS GRINDING TIME,  
FEWER SHUT DOWNS—*net result—lower tool costs.*  
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### With Vacuum Cup METAL PULLEYS

Eliminate belt slippage and increase machine production. On hard drives, belt life increased 2 to 5 times. Will not wear down or uneven.

Patented  
tion line. Sizes: 2" to 72". 30-day free trial offer.  
TRY ON YOUR WORST DRIVE.

VACUUM CUP METAL PULLEY CO., Inc.  
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FULLY  
GUARANTEED



Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.  
No. 2 cuts up to  $\frac{1}{4}$ " steel plate.

Special Blades for shearing stainless steel.

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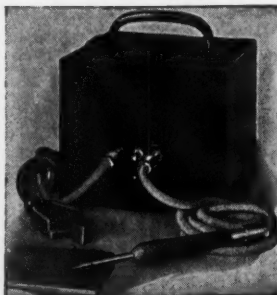
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THE ORIGINAL ELECTRIC - ETCHER

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GRAND  
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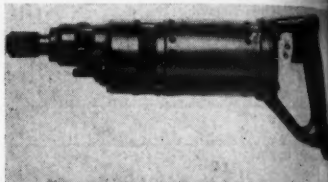
ELKONITE TIPPED PENCIL

*Circulars on request.*

**WM. BREWSTER CO., INC.**  
40 CHURCH ST. NEW YORK, N. Y.

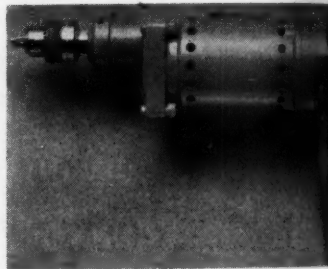
of outstanding construction features claimed for these tools.

Stators are secured to the field by multiple projecting keys which are integral with the stator itself, the engaging corresponding keyways in the field casing. This construction is to provide an exceptionally rigid



Rotor 467 S Screw Driver with Double Able Impact Clutch, 1,500 R.P.M.

ing for the stator and at the same provides a large number of ample channels for air. Synthetic plastic insulating wire is used for the stators, which



Rotor 674 D Side Handle Drill, 1,000 R.P.M.  $\frac{1}{8}$ -In. Capacity

said to make possible more usable power and longer life.

The rotor contains solid copper rotor 100 per cent conductivity, welded



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FEEDS  
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THE V&O Press Co.

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March 1939

## MADE TO TAKE PUNISHMENT



THOR STAMPS are made of special, tough alloy steel—correctly hardened to withstand any punishment you can give them. They give clear, uniform marks—for a long time.

Send for a few trial stamps—punish them—see how they take it. Write today.

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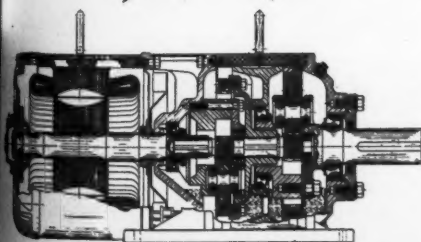
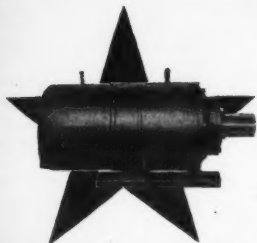


**ARGUTO OILLESS BEARING CO.**

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## STAR

**A.C. - GEAR MOTORS - D.C.**



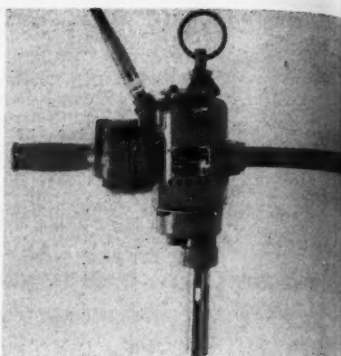
● This type STAR Gear-Motor is built in sizes from  $\frac{1}{2}$  to 75 h.p.\* With integral 1800 r.p.m. A.C. or D.C. motors, this type will provide output speeds between 132 and 56.5 r.p.m.\* Used in many applications, such as pumps, mixers, dyeing equipment, washers, cranes, elevators, etc.\*

*Write for complete details  
and Catalog showing other  
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**STAR ELECTRIC MOTOR CO. BLOOMFIELD NEW JERSEY**

massive copper end plates as shown in the illustration. This construction is claimed to be mechanically rigid and highly efficient electrically.

Fusetrons or time lag fuses are included in the handle without adding appreciable weight or bulk. This feature is said to decrease maintenance cost by providing correct overload protection at the tool itself, safeguarding it from prolonged overloads but at the same time permitting momentary excess current for starting and short time overloads. The field casing and handles are made from heat treated magnesium alloy which minimizes the weight and at the same



Rotor 467 D Drill, 4,000 R.P.M., 1/2-In. Capacity

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Easy and Economical with Flynn Micrometer Boring Heads.

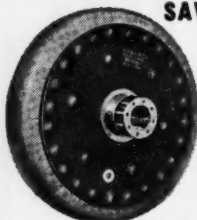
For large and small holes. Bar capacity 3/16" to 1 1/2" diameter.

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Hyatt Roller Bearing  
Heavy Duty

RE-WHEEL YOUR  
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Easy Rolling  
Long Wearing  
Sizes for all trucks.  
Casters for all  
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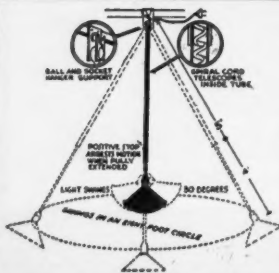
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**METZGAR CO.**  
112 Logan St. S. W.  
Grand Rapids, Mich.  
U. S. A.

time maintains the strength and rigidity of the tool. Parts subject to heavy wear, such as the gear cases, bearing plates and clutch housings, are of malleable iron. Special attention has been paid to interchangeability of parts between drills, nut setters and screw drivers with the same motor.

The entire line of high cycle tools is equipped with the new Rotor Triple Action Clutch which gives uniform tension to nuts and screws and increases the capacity of the Rotor power unit. The clutch applies the impact principle to screw driving and nut setting, greatly increasing the turning effort of the clutch so that it is in excess of the torque supplied by the motor.

Right angle and special angle attachments for right angle drilling, screw driving and nut setting have been designed that they may be equipped with single positive clutches, single adjustable impact clutches, or double adjustable impact clutches with a wide variety of drives.



## Universal Movable Zig-Zag Light Support Stays Put

ZIG-ZAG LIGHT SUPPORT moves in a wide radius, up and down and stays put where you leave it, gives good service. Fasten it to ceiling, a beam, or a machine and you can work with it without glare.

**J. ZAGORA MACHINE & GEAR CO.**  
1325 SOUTH MINT ST. • CHARLOTTE, N. C.

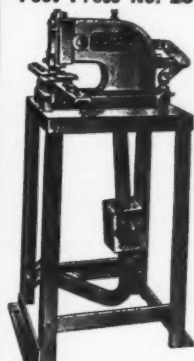
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U. S. Multiple Drill Heads are made for drilling 4 to 50 holes at once. Thus, you get more holes per minute and larger profits. Our years of specialization in this work will save you money and assure an accurate, dependable and swift job. Send your blue prints for estimates.

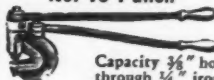


**THE  
United States  
Drill Head Co.**  
1954 Riverside  
Drive  
CINCINNATI,  
OHIO

## Foot Press No. 28



Capacity 2" hole in 16  
gauge—100 holes per min.  
**No. 10 Punch**



Capacity  $\frac{3}{8}$ " hole  
through  $\frac{1}{4}$ " iron.  
Weight 6  $\frac{3}{4}$  lbs.



**Angle  
Iron  
Shear  
No. 4**

Capacity  
2x2  $\frac{1}{4}$ "  
Angle Iron  
Weight  
44 lbs.

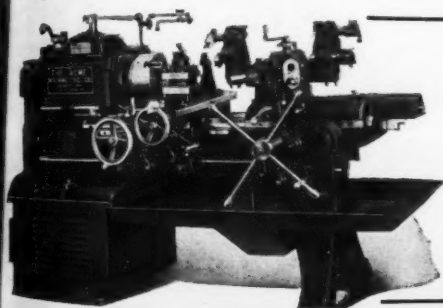
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**80 ITEMS  
FROM WHICH  
TO CHOOSE**

**Whitney Metal Tool Co.**

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## Cincinnati Acme

### Universal Turret Lathes

The No. 4W Acme Universal Turret Lathe with its unusual high operating efficiency and simplified design, insures maximum production on all work within range. Write for circular.

**THE ACME MACHINE TOOL  
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# Are we using Cutting Off Tools

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*J. Milton Luers*

**Operators' Handbook for Hendey Lathes.** Second Edition Revised. This book, consisting of 96 loose leaf pages wire-bound in an imitation leather cover, contains all the information necessary for the installation, operation, and maintenance of the precision lathes built by The Hendey Machine Co., Torrington, Conn. Beginning with two lathe charts, one each for the geared head and cone head lathes, upon which each individual part is numbered and identified, the illustrations show the different operations in the manufacture of the lathe, following with photographs

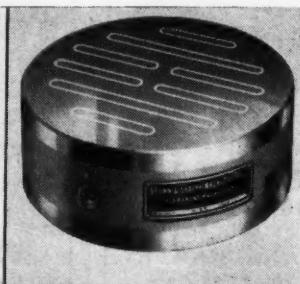
and drawings of all of the different parts included in a Hendey lathe. Full instructions are given for disassembly, repairing and assembling the various parts of the lathes and the book closes with detailed instructions for the use of the relieving attachment on taps, hobs, and other tools. Copy free upon request.

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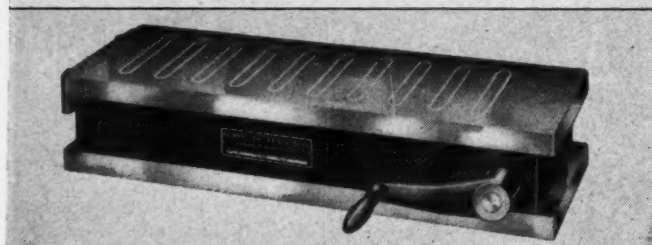


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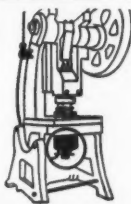
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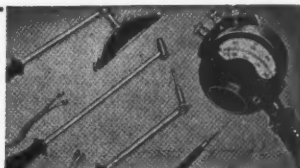
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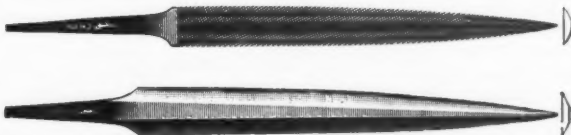
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13. **Drill Grinders**  
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14. **Oil-Hardening Tool Steel**  
Ketos Oil-Hardening Tool Steel is detailed in a bulletin issued by Crucible Steel Co. of America, 405 Lexington Ave., New York, New York.
15. **Lathe Operators' Handbook**  
The Hendey Machine Co., Torrington, Conn., has issued a revised second edition Lathe Operators' Handbook.
16. **Hacksawing**  
Helpful hints on the care and use of hack saw blades are included in a 20-page booklet titled "Hacksawing." Simonds Saw & Steel Co., Fitchburg, Massachusetts.
17. **Small Hole Grinding**  
Rivett Lathe & Grinder, Inc., Brighton, Boston, Mass., has issued Bulletin 104-C, giving details on the Rivett No. 104 Internal Grinder.
18. **Grinding Wheel Dressers**  
Vincent Steel Process Co., 2434 Belle

vue Ave., Detroit, Mich., has available descriptive bulletins on Vincent Grinding Wheel Dressers.

#### 13. Air Valves and Cylinders

New Illustrated Bulletins featuring Nopak air valves and cylinders have been issued by Galland-Henning Mfg. Co., 2758 S. 31st St., Milwaukee, Wisconsin.

#### 14. Hammer Development Data

C. C. Bradley & Son, Inc., Syracuse, N. Y., is issuing a series of bulletins featuring Bradley Hammer Forging and the ability of these Hammers to form metal in impression dies to close tolerances.

#### 15. Magnetic Chucks

Circular W3 illustrates and describes the line of Walker Magnetic Chucks and Demagnetizers. The O. S. Walker Co., Worcester, Mass.

#### 16. Rotary Tables

Catalog No. 5 features Troyke Rotary Tables for milling machines, die sinkers, slotters, shapers and drilling machines. Alfred A. Troyke, 217 E. Second St., Cincinnati, Ohio.

#### 17. Light-Duty Drill

The new Thor Drillmaster, Light-Duty  $\frac{1}{4}$ -In. Capacity Electric Drill is fully described and illustrated in Circular E-22. Independent Pneu-

matic Tool Co., 600 W. Jackson Blvd., Chicago, Illinois.

#### 24. Flat Turret Lathes

A new bulletin has been issued by Jones & Lamson Machine Co., Springfield, Vt., detailing the 2J, 3J, 4J, and 3JS Cross Sliding Head Flat Turret Lathes.

#### 25. Portable Electric Tools

Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill., has released Catalog No. 40. It is a 56-page catalog illustrating and describing the Skilsaw line of portable tools.

#### 26. Rotary Positive Air Pumps

Leiman Bros., Inc., 3W-23 Walker St., New York, N. Y., has available a 32-page booklet describing and illustrating applications of Leiman Rotary Positive Air Pumps.

#### 27. Tool Steel Guide

Bethlehem Steel Co., Bethlehem, Pa., has issued a 36-page booklet outlining the entire range of tool steels and their fields of use, plus a systematic method for selecting the right steel for the purpose.

#### 28. Motors

Various type motors, gear-motors, brake motors, and motor generator sets are illustrated in Bulletin No. 2 issued by Star Electric Motor Co., Bloomfield, New Jersey.

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